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MISSION STATEMENT

The mission of *Ultimate Home Design* is to serve as a catalyst for homeowners to create demand for architects, designers, and builders to adopt the concepts and building practices that define human-centered, optimum-performance home design. *Ultimate Home Design* is aimed at broadening the segment of the American population that is paying closer attention to the products they buy, looking beyond price and branding to focus on other elements of the production and value chain. Increasingly homeowners want to support sustainable building practices that result in a higher living standard. *Ultimate Home Design* is for those homeowners who want to promote a broader shift in patterns of production and consumption by encouraging practices that better reflect their personal values. We are advocates for using products that reduce energy and use renewable, recycled content or otherwise environmentally preferable materials. An important part of our mission is to promote building practices that result in a substantial reduction in energy use for space conditioning, water heating, lighting, and appliance operation. Another important aspect of our mission is to promote construction practices that improve the indoor environment and reduce the risk of building-related illness. This translates to improved occupant health and comfort by improving thermal comfort; natural lighting and electric illumination; and controlling humidity, odor, noise, and vibration.

Ultimate Home Design is for the thinking homeowner, who wants to be educated and learn about intelligent options for home design, whole-house system design, and comprehensive electronic lifestyle features that can enrich the quality of day-to-day life while reducing the cost of operating a home. With the knowledge gained reading *Ultimate Home Design*, you will be empowered to make intelligent choices about the design and make-up of your home, whether considering remodels or additions, planning a new home, or evaluating an already-built home. *Ultimate Home Design* will explore the wide range of possibilities within the context of designing Optimum Performance Homes™ that integrate universal design architecture; sustainable green building materials and techniques; energy-efficient power systems for electricity, lighting, heating, and air conditioning; water conservation techniques; and comprehensive electronic lifestyle features.

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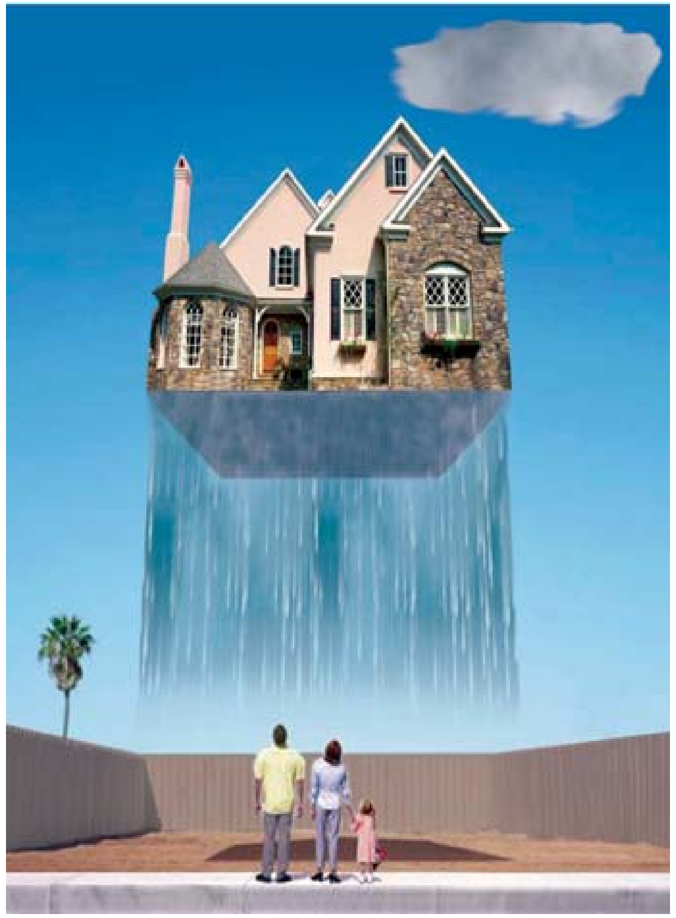

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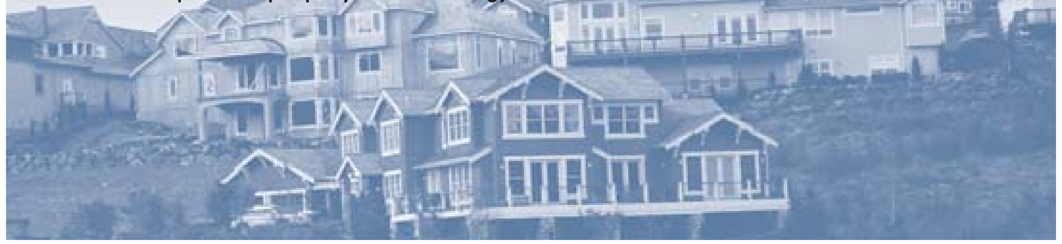

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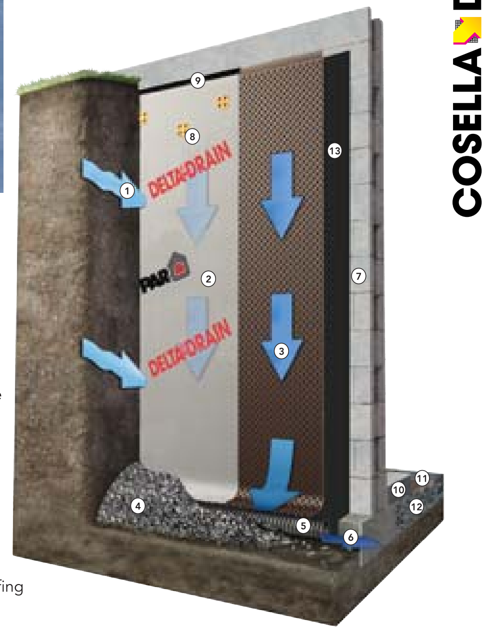

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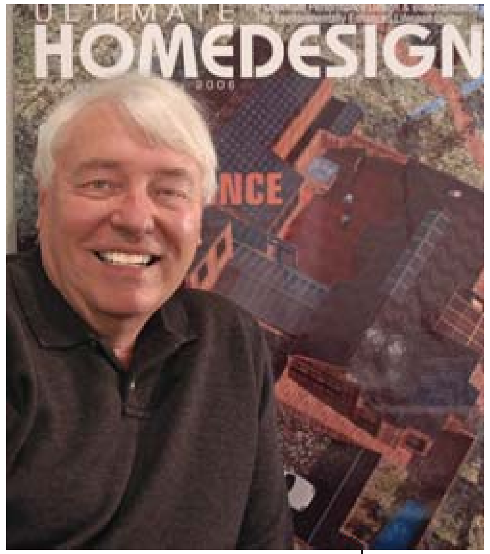

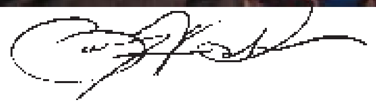

Ultimate Home Design™ Themes And Variations

As we progress with writing about the poignant themes and their variations that *Ultimate Home Design* advances, there is the absolute necessity for architects and architectural designers and the various disciplines that comprise a design and build team to commit to sustainable design and responsible building science practices.

Over the course of a four-year period that I have spearheaded the design of the first Optimum Performance Home™ at The Sea Ranch, California, I have become aware that what is needed is a more direct linkage between the design community and the responsibility they exercise in the building process as it impacts a sustainable and interconnected community. Too often, design teams, including design committees and planning commissions, are "not interested" in trying to incorporate something they are "not familiar with." Too often, "architectural design" overpowers "function" to the detriment of alternative sustainable solutions, and, as a result, saddles communities with undesirable environmental consequences. This is a lose-lose proposition that forces progressive property owners to adopt less-than-optimum design compromises in order to receive the necessary approval to build from such oversight authorities.

Homes account for a huge percentage of the energy consumption in the U.S. Architectural designers need to recognize that the design, building, and equipping of homes have a significant collective impact on the environment. They also need to recognize that proven technologies (solar photovoltaic, wind, and geothermal) can provide a considerable amount of energy to meet most domestic needs, and enable day-to-day home operation to cost nearly zero when a significant portion of the energy needed to operate them is provided on site.

This approach not only is the right approach to embrace to reduce the adverse impact on the natural environment, but also will lead to appraisal assessments that recognize the attributes of an efficient and cohesive floor plan, flow, the home's responsiveness to its natural setting and climate, attention to craftsmanship, age-friendly livability, and interior health enhancements as the metrics used to determine value. At present, homes built to these higher standards are still regulated to the price-per-square-foot yardstick used to access production track homes where there is little difference in the various home model choices and where such quality attributes are not present. Homeowner clients and real estate appraisers need to understand that there are other, more relevant ways to measure a home's value. Using "quality" as the metric to determining value will encourage homeowners to invest in better building practices.

Until the architectural profession begins to promote sustainable design and resource conservation, and embrace new building science practices that truly result in buildings that touch the earth lightly during both construction and day-to-day operations once built, and respect the beauty and diversity of the natural setting surrounding them, we will continue to see buildings inappropriately designed.

I took heart with the new position statement issued by the American Institute of Architects. The statement declares that the "AIA will develop and promote the integration of sustainability into the curriculum for the education of architects and architecture students so this core principle becomes a guiding mindset for current and future architects." See "AIA Promotes Sustainable Design" to read more about this long-overdue initiative. Next, we need an inter-disciplinary curriculum that includes those core sustainable green build and on-site clean energy generation approaches and techniques along with age-friendly universal design, Biophilia appreciation, and whole-house integrated electronic lifestyle system design.

Inside This Issue

Part III continues as a case study of the design and building of the first Optimum Performance Home, a platinum-level LEED® for Homes project. LEED (Leadership In Energy & Environmental Design) is a certification program of the U.S. Green Building Council. Complementing the case study are two articles, one authored by Bill Wilson, Environmental Planning, LLC, on watershed management, and the other by Julie Stewart-Pollack, ASID, IDEC, on the subject of Biophilia, which can be defined as the human love for nature. UHD

Public Strongly Backs Current Housing Tax Incentives

Given a choice of simplifying federal tax laws or retaining current housing incentives, Americans resoundingly prefer the latter, according to a new nationwide survey of 1,001 adults.

By a more than three-to-one-margin (68 to 22 percent), a poll conducted by RT Strategies found that survey participants favor retaining deductions for mortgage interest and state and local taxes over a plan to change the current tax code.

"The survey offers a cautionary note for those in the Administration and on Capitol Hill who may be tempted to endorse the recommendations of the President's Advisory Panel on Federal Tax Reform, which would wipe out popular tax incentives that promote homeownership and affordable housing," said Jerry Howard, Executive Vice President and CEO of the National Association of Home Builders (NAHB).

The White House and Treasury Department have yet to comment on the advisory panel's proposal, which was presented to the Administration on November 1, 2005, as part of an overall effort to overhaul the tax code.

The plan calls for replacing the mortgage interest deduction with a far more limited 15 percent tax credit. Also gone would be deductions for state and local taxes (including property taxes) and interest deductions for home equity loans and second homes. It would also eliminate the Low Income Housing Tax Credit, which accounts for the construction of more than 130,000 affordable rental housing units annually.

Commissioned by the NAHB to determine the public reaction to revamping the current tax system, the polling firm found that an overwhelming majority of respondents support federal tax policies that foster the American dream of owning a home.

Specifically, 79 percent said it is reasonable for the federal government to provide tax incentives to promote homeownership, and 82 percent believe the government should use the tax code to encourage affordable housing.

"Registered Democratic and Republican voters in all age groups view efforts to tamper with home interest deductibility as a major threat to their retirement security and their ability to pay for their children's college educations," said Lance Tarrance, who, along with Thomas Riehle, is a partner of RT Strategies. "For many older homeowners, the equity built up in a home also provides an important hedge against unanticipated health care costs."

Moreover, 71 percent of survey respondents oppose the idea of changing the tax code to encourage people to invest more in stocks and bonds and less in the homes that they own. "And that is exactly what the advisory tax panel's plan would do," said Howard.

"As we learned in watching the recent California initiative battles, complex proposals tend to lose support, not gain support, as they get more public attention," said Riehle. "This proposal starts with no real core of supporters."

This article appeared in NAHB's *Nation's Building News*. For more information on the NAHB resources on the tax reform issue, including a link to an ad outlining NAHB's position on tax reform in the *National Journal*, *Congressional Quarterly Weekly*, *Roll Call*, and *Washington Post*, visit www.nahb.org/category.aspx?sectionID=875. UHD

Canada Commits To Legislate Protection Of More Than 5 Million Acres Of Great Bear Rainforest

A coalition of four leading environmental groups, along with industry leaders and indigenous groups, celebrated success in early February 2006 after a decade-long campaign to protect the globally unique Great Bear Rainforest. The long-awaited government announcement protects one-third of the Great Bear Rainforest from logging and will require the use of more sustainable logging practices for the remaining area. The agreement also sets a new precedent for decision making for local indigenous groups (First Nations), giving them the right to define what happens on their land.

The total area protected from the chainsaw equals 5 million acres, twice the size of Yellowstone Park and equal to 6,300 acres of New York's Central Park. This total includes new and previous protection areas, plus special no-logging zones.

"Is it possible to balance economic interests, environmental protection, and the hopes and dreams of communities? Today British Columbia proved that it is," said Merran Smith, Director, BC Coast Program, ForestEthics. "This rainforest agreement provides a real-world example of how people and wilderness can prosper together. And this is just the beginning."

ForestEthics, Greenpeace, and Sierra Club of Canada, BC Chapter, have worked toward this solution for almost a decade, using tactics that ranged from blockades to boycotts to boardroom negotiations, all in a bid to protect as much of the Great Bear Rainforest as possible.

"For more than a decade, all eyes have been on Canada's rainforest," said Amanda Carr, Greenpeace Forest Campaigner. "If today's promises become reality, we'll have a global model of sustainability, exactly what international customers of British Columbia would tell us they want."

This agreement represents hundreds of thousands of hours of dirt-under-the-fingernails work by one of the most unexpected alliances in Canadian history. It included a blue-ribbon science panel supported by governments, environmental groups, and logging companies that developed specific recommendations to change logging practices.

"From here we'll be working with First Nations to ensure today's commitment results in real change on the ground— that forest practices are different than the kind of logging that has inflicted so much damage in BC's coastal rainforest," said Lisa Matthaus, Coast Campaign Coordinator with Sierra Club of Canada, BC Chapter.

To date, almost half of a $120-million investment package has been raised by U.S. and Canadian donors for conservation and sustainable business ventures in First Nation territories. The BC government has committed $30 million to the financing package, however, the Canadian government has yet to commit its $30 million share.

The Great Bear Rainforest Agreement means:

- Five million acres are protected from logging.
- The application of better, lighter-touch forestry by March 2009.
- Comprehensive First Nation's involvement in management over their entire traditional territory.
- The diversification of the economy based on conservation. UHD

BREAKING ground

Downsizing Is Not The Only Option For Boomers

Many "baby boomers" are using their wealth to build larger homes for their retirement. In previous years older homeowners who sold their homes would use the money to downsize their living arrangements. The new trend among aging baby boomers is to use the money from the sale of their homes to build the home they have always wanted. Usually this new home is much bigger and has more amenities.

Homeowners see these purchases as a wiser investment compared to the stock market. Many baby boomers lost much of their retirement funds when the stock market was unstable. So for many baby boomers, cashing in on their homes allows them freedom to create their fantasy homes. Troy Campa, principal of Newberry Campa Architects LLC in Houston stated that 30 percent of his business are baby boomers building these new homes, with an increase of 10 percent each year. This generation wants to fully enjoy their retirement years and is creating mini-retreats with their new homes.

In order to pay for these massive homes, some baby boomers also take out another mortgage or use stocks to pay for the construction. Some homeowners choose not to move out of their current residences and use loans to expand their current home. They are taking advantage of low rates to remodel their home so that they can age in place. Along with creating these dream homes, more emphasis should be placed on using the funds for home modifications. Without them the homeowners may not be able to enjoy their spacious homes in their later years.

Source: Laura Koss-Feder "A Castle Built For Two: A Growing Number Of Empty Nesters Are Pouring Their Life Savings Into Mega Homes" U.S. Edition, *Time* Bonus Section: Generations May 2005 (April 25, 2005). UHD

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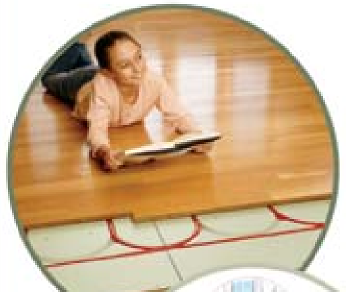

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Universal Design Makes Homes Useful For Every Stage Of Life

By Laurie A. Cerny
Special to the Kalamazoo Gazette
Thursday, February 26, 2006

Universal design has the potential to make accessible living a possibility for almost everyone, yet few houses embrace the concepts of universal design. Few people who are building new homes know about the importance of accessibility features, and real-estate agents need to know more about finding homes that have universal-design features, experts in the universal-design field say.

"Virtually all people will benefit from universal design," said Paul Ecklund, an Americans With Disabilities Act specialist with the Disability Resource Center of Southwest Michigan. "It just makes it [living] easier for everyone all around."

Universal design also is known in the housing industry as "visit-able," "barrier-free," "easy-living," and "housing for lifespan." It implies main-floor living with zero-step entrances to houses, wider doorways and hallways, and bathrooms that are large enough to accommodate wheelchairs and have other accessible features like grab bars and 18-inch-stool comfort toilets.

"It [universal design] is part of the cradle-to-grave philosophy," said David Orchanian, Assistant Faculty Specialist with the Department of Occupational Therapy at Western Michigan University. "The design is such that the house and environment will handle strollers as well as someone with a walker."

Richard Baker, a retired architect in Kalamazoo, who in 2005 served on a 10-person committee organized by Ecklund called the Housing Accessibility Team, has been an advocate for educating homeowners and builders about the benefits of accessible living for all age groups and all mobility levels.

"I think we need to build so they (homeowners) can adapt the home they've got or they can find one with accessible features," Baker said. "We have a tremendous amount of houses that are not accessible for people to live in as they age or if they have a disability."

Ecklund said that more than 95 percent of the existing housing stock in the Kalamazoo area would not be accessible to a person in a wheelchair. Not only does that raise mobility issues for homeowners, it also affects how easy it is to visit the home for someone in a wheelchair.

Ecklund said, though, that the current Fair Housing Act now requires that at least 5 percent of new housing developments include homes or housing units with accessibility features.

Speaking at a conference called Concepts In Home Modifications at Western Michigan University in March 2005, Baker said that there are three factors that affect the accessibility of housing stock.

The first is whether the structure or structures can be adapted with simple modifications, such as grab bars in bathrooms and lever handles on doors and on faucets.

The second is to make structural changes, such as enlarging doorways, that would make a home more desirable for anyone who buys it in the future.

The third is whether accessibility modifications reduce a home's resale value because of the limited number of potential buyers who also would need such modifications.

"A house built according to universal design addresses all of those considerations," Baker said. Universal design makes a new house "livable in a universal way" and is designed in such a way that accessibility features go unnoticed.

"In addition to educating homeowners and builders," Baker said, "educating real-estate agents is important so they understand how to assess accessibility features."

For more information, visit the Center of Universal Design at North Carolina State University, www.ncsu.edu/ncsu/design/cud and the Kalamazoo Kent County Disability Advocates, www.zerostep.org Web sites.

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RMC Research Foundation Releases Ready-Mixed Concrete LEED Reference Guide

The RMC Research Foundation has announced the release of the Ready Mixed Concrete Industry Leadership in Energy and Environmental Design (LEED®) Reference Guide. The guide will educate ready-mixed concrete producers, construction contractors, architects, and others in the construction industry about the environmental benefits of concrete and how they may fit into projects that are to be LEED Certified. The "Ready-Mixed Concrete Industry LEED Reference Guide" is available for download from the RMC Research Foundation's Web site at www.rmc-foundation.org. UHD

What Constitutes A Building Automation System?

According to Larry Rowland, a Senior Project Manager for Savage Engineering, "A building automation system is comprised of electronic equipment that automatically performs specific facility functions. The commonly accepted definition of a BAS includes the comprehensive automatic control of one or more major building system functions required in a facility, such as heating, ventilating, and air conditioning (HVAC) systems. In many cases, a BAS includes lighting, security, fire safety, industrial processes, and more.

"Automated systems include a collection of sensors that determine the condition or status of parameters to be controlled, such as temperature, relative humidity, and pressure. Similarly, output devices impart electronic signals or physical action to the control devices. Examples include electric relays or damper and valve actuators. The sensors and output devices are connected either to a unitary controller or to a distributed processor. Unitary controllers are limited to the needs of an intended function and have limited capabilities, such as memory size. Distributed processors can accommodate the needs of several unitary controllers, as well as connect directly to input and output devices.

"Distributed processors usually have more memory and more flexibility than unitary controllers. For example, unitary controllers often control single-zone air handling units with heating and cooling coils, and may use temperature and relative humidity values from that system to accomplish the control. The same unitary controller commonly is connected to a distributed processor that has most or all of the unitary controller's activity signals passed on to it.

"The final major component of a BAS is the head end. The head end is usually a personal computer that is set up to monitor all of the distributed processors in the system. There may be several head ends in larger systems. Many systems are arranged to use a laptop computer that functions as the stationary head end, but also connects directly to distributed processors, unitary controllers, and other points in the system.

"There can be many combinations of BAS components in any application, but most fit this general description. Understanding the generic layout of an automated system is important to grasp the impact that communications have on effective function." UHD

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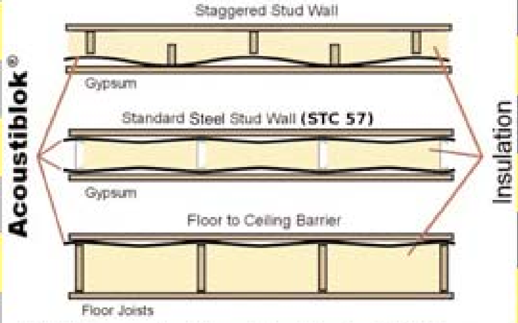
Condos, hotels, offices, public buildings, engine rooms, home theaters, traffic noise, the needs are endless. Today's construction techniques do not lend themselves to noise reduction. The materials used (if any) are fiberglass, foam insulation, or extra layers of drywall. These do little to stop noise transmission. Even a concrete wall is a poor sound barrier. Solid, rigid materials vibrate, producing sound on the other side. Acoustiblok however, works like a sheet of lead. It has tremendous mass (1 lb. per sq ft). It is installed loosely, thus in flexing with sound waves, it "expends" acoustic energy. This is a far better method than rigid materials.



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New
to the neighborhood

Sarah Scaglione

Southern Wood Floors harvests buildings, not trees, to make antique heart pine. The company reclaims beams and timbers of historic wood from 18th- and 19th-century buildings, and meticulously mills them for floors, walls, stairs and cabinet stock. The result is a rich, noble wood that can be as much as 200 years old. Southern Wood Floors precision mills five grades of solid wood, tongue-and-groove, site finished antique heart pine flooring. Most grades are available in wide plank up to 10 inches. Not just a renewable resource, Southern Wood Floors antique heart pine is a renewed resource. Southern Wood Floors also manufactures wide plank heart pine and Southern Yellow Pine, all harvested from fully sustainable forest resources. Last year, the company introduced three prefinished solid heart pine floors, and this year Southern Wood Floors introduces a uniquely engineered, prefinished Antique Heart Pine, which can be installed conventionally or as a floating floor. Southern Wood Floors sells directly and ships nationwide. Visit their Web site at www.southernwoodfloors.com or phone toll-free 888 488 7463.

American Clay, the Original Earth Plaster, introduces another creative addition to their unique line of natural finishes for interior walls and ceilings. The long-awaited Marittimo finish uses reclaimed shells as its base and is derived from a traditional Moroccan plaster known as "tabi." This two-year work-in-progress is recognized by its luminescence and durability. American Clay plasters are the natural choice for beautiful walls; a unique combination of natural clays, aggregates, and pigments to create colors and textures that create healthy, wholesome environments. You can reach American Clay by phone at 866 403 1634, or visit them online at www.americanclay.com.

Earth Weave Carpet Mills, Inc. has been an innovator in the sustainable floor-covering segment since the birth of their company 10 years ago. Claiming to be the first, and subsequently, the only company in North America to develop a completely all-natural, 100-percent biodegradable carpet, Earth Weave introduces McKinley to their Bio-Floor™ line. McKinley is a 44-ounce face-weight carpet that is currently available in an off-white color. Staying true to the Bio-Floor line, McKinley is made with a wool face fiber that contains no dyes, chemicals, or pesticides. Constructed as a medium-sized, slightly-textured loop, with a very soft feel while maintaining excellent durability, every aspect of McKinley is 100-percent natural and biodegradable. Take the next step with America's only non-toxic, all-natural carpet. 706 278 8200, www.earthweave.com.

MTI Whirlpools Does bath time with Buster leave you soaked and sore? MTI Whirlpools offers the ultimate in luxurious pooch pampering. Jentle Pet™ spa was designed with you and your pet in mind. The Jentle Pet design includes a generously-sized bathing well with a non-slip bottom whose construction actually dampens the sound of water filling the tub to provide a less stressful audio environment for your pooch. Spacious shelves for shampoos and supplies, conveniently positioned retaining rings for tethering, hand shower, and a low-profile, rounded front design all contribute to human comfort. This creative bathing unit has been thoughtfully and ergonomically designed specifically for canine members of the family to provide a comfortable, therapeutic, safe environment for dog bathing. Heighten the supreme pet spa experience with four full-size point-massage whirlpool jets to complete not only a relaxing but also therapeutic experience. 800 783 8827, www.mtiwhirlpools.com.

The Icynene Insulation System® is a spray-in-place, water-blown, soft-foam insulation that minimizes air leakage in the home for increased energy efficiency while also creating a healthier indoor environment. Applied as a liquid, Icynene® spray formula expands to 100 times its initial volume and adheres to the building material to seal gaps and crevices that compromise air tightness. Traditional fiber insulation leaves gaps and seams where air can get in and out. A tighter building envelope means less drafty areas, and a consistent, comfortable indoor temperature becomes easier to maintain. With an improved building envelope, installation of smaller, less expensive heating and cooling systems are also a benefit. This complete insulation and air barrier system contains no HCFCs, HFAs, HFCs, or formaldehyde once cured, and limits the penetration of outdoor pollutants, molds, and allergens. Its acoustical properties contribute to the overall performance and deliver a quieter home by reducing outside noises. Ideally suited for steel- and wood-frame construction, Icynene is also used for renovations and retrofits. To find a dealer today, phone 800 758 7325 or visit www.icynene.com.

G-P Gypsum, a subsidiary of Georgia-Pacific Building Products, introduces DensArmor® Plus paperless drywall; a highly mold-resistant interior gypsum panel ideal for moisture-prone interior walls. The walls inside most homes are made of paper-faced drywall. Since mold eats paper, removal of the paper greatly reduces the chance of mold actually growing. Ingrained in its ingenious technology, DensArmor features a substantially inorganic gypsum core with fiberglass-mat facings on both sides. No paper on the surface or in the core equals less places for mold growth to get started. DensArmor Plus is affordable and installs in the same easy steps as regular drywall. For further information, call 800 BUILD GP, or visit their Web site at www.densarmourplus.com.

American PolySteel, LLC. Since 1978, American PolySteel has been a pioneer in developing one of the safest, most energy efficient, and advanced alternatives to wood-frame construction. PolySteel® and PolyPro™ are insulated concrete forms (ICFs), used to build structural walls for residential and commercial buildings. The PolySteel wall system combines solid, reinforced concrete with high-density expanded polystyrene and galvanized steel. These forming units are stacked together to form a wall. When coupled with concrete, a solid wall system is created with superior structural integrity and thermal insulation. Drywall, stucco, or siding can be attached directly to this insulated concrete wall. Beyond energy savings and increased air quality, PolySteel homes are also much safer, providing four-hour fire protection, as well as mold and termite resistance. PolySteel also withstands tornadoes and hurricanes, as well as being ideal for seismic zones. To build your home with the ultimate in comfort and safety, call PolySteel at 800 977 3676 or visit www.polysteel.com.

Rinnai® Rinnai North America, a subsidiary of the world's largest gas appliance manufacturer, Rinnai Corporation, introduces the R85 Plus. This unit encompasses the best of Rinnai's tankless water-heating technology inside a flangeless, one-piece outer casing with a silver finish. With Rinnai tankless water heaters, you only pay to heat water when you need it and only for as long as you want it. No longer requiring utility rooms to conceal gaudy equipment, the R85 is uniquely designed to allow you to showcase your tankless water heater anywhere in the home, and it is the perfect complement to hot-water application in your kitchen or bath. The uniqueness of Rinnai's water heaters allow homeowners the luxury of using multiple hot water sources at once without any loss of temperature consistency. The compact design allows for flexible installation and can mount internally or externally while saving more space compared to standard tank water heaters. Enjoy continuous hot water as well as significant energy savings with Rinnai. 866 746 6241, www.foreverhotwater.com.

Gladiator™ GarageWorks

Gladiator™ GarageWorks Add a new meaning to "spring cleaning" with the ultimate storage solution. Gladiator GarageWorks, by Whirlpool Corporation, offers uniquely designed, garage-tough products, expertly crafted to enhance any garage. Whether you are an avid adventurer or a week-end gardener, every component is made to work together or stand alone to meet any storage requirement. Reclaim valuable floor space with Gladiator® GearTrack™ Channels, a heavy-duty, patented design wall system, or GearWall®, a slot-wall sys-tem. Add style and convenience to your garage by incorporating a modular refriger-ator, trash compactor, Freezerator® , and/or Chillerator™; all equipped with the sleek, rugged Tread Plate design. Complete your project with either Gladiator's roll or tile floor covering. Both will quickly improve the look of your garage floor without the hassle of messy liquids. Take your garage to the next level today. 866 342 4089. www.gladiatorgw.com.

Berg&Berg

Berg&Berg The extraordinary floors of Berg&Berg, Sweden, makers of Europe's finest engineered flooring products, are now avail-able in the United States, distributed through SouthFloor. Berg&Berg floors are known world-wide for being crafted to exacting tolerances. They join with the unique, patented Svedlok system, and can be installed as floating floors over any suitable surface. Berg&Berg floors are prefinished, with a 25-year finish warranty and a lifetime manufacturing warranty. They are available in wide plank, two-strip, and a three-element longstrip design. Many Berg&Berg floors carry FSC certification, and all are made entirely of fine natural woods in the country recognized as the world market leader in quality and pro-duction of engineered wood flooring. Berg&Berg prefinished engineered floors include Ash, Beech, American and Brazilian Cherry, Red and White Oak, Merbau, Silver Maple, Patagonian Pear and Cherry, and American Walnut. For more information and a complementary 52-page brochure, contact Berg&Berg at SouthFloor by phoning 866 271 7463 or visiting www.BergandBergUSA.com.

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Wayne®-Dalton For more than 50 years, Wayne-Dalton has created innovative garage doors and openers for residential and commercial customers. Continuing with this trend, Wayne-Dalton intro-duces the revolutionary door that combines the realism and design flexibility of wood with the maintenance-free insulation benefits of steel with their first ever fiberglass-clad door. The Wayne-Dalton Model 9800 garage door utilizes technolo-gy that bonds a beautiful wood-grain fiberglass outer surface to a rugged steel sub-structure. The end result is a beautiful natural wood appear-ance, increased energy effi-ciency and noise reduction, without the warping, splinter-ing, or denting common with wood doors. Customize your garage door with custom paint or stain, or simply choose from their standard factory colors, such as mahogany, oak, or walnut. Additional door features include pinch-resistant panel joints for safe-ty and a high insulation value for comfort. Available exclu-sively through Wayne-Dalton dealers. 888 827 DOOR, www.wayne-dalton.com.

PEARL™ Protected

PEARL™ Protected is headquartered in Atlanta, Georgia, and is redefining the standards of home and safety through its patented, break-through product, PEARL, a revolutionary Permanent Escape And Rescue Ladder that can be quickly and easily deployed in the event of a residential fire or other home emer-gency. PEARL permanently installs in the wall, under any window above the first floor, and works in two- and three-story homes. PEARL can be incorporated into either your new home or remodel plans. Another great feature of this revolutionary product is that it is easily repacked, which enables you to have as many practice drills with your family that you need. Keep your family safe with PEARL Protected. 800 374 5737, www.PEARLprotected.com.

Improving Tomorrow

Improving Tomorrow Improving Tomorrow's Central Home Automation Director (also known as CHAD) delivers convenience and lux-ury by placing "Your Home at Your Fingertips" using your existing home computer and high-speed Internet connection. The computer can auto-matically control and monitor appli-ances, cameras, home theatre sys-tems, thermostats, lamps, sprinklers, and more—whether you are at home, at work, or even traveling abroad. With CHAD as a home monitor, you can manage your home from anywhere via the Internet, as well as receive text-mes-sages on abnormal events, maintain safe-ty with automatic lighting, and turn off all lights at bedtime with one button. CHAD can also act as a personal assistant, keeping track of your family's schedule with an integrated calendar. You can install the CHAD system with the help of the simple setup wizard guides. A private Web interface allows you to control, share, customize, monitor, and manage the system from anywhere you can get online. For more information, phone 888 891 6430 or visit www.ImprovingTomorrow.com.

Monster®

Monster®, known to thousands of audio, video, movie, and music enthusiasts as the com-pany that makes their products work better, intro-duces Monster Central Controllers and IlluminEssence' Lighting System Switches, Dimmers, and Lighting Controller, a new genera-tion of products set to redefine whole-home con-trol. The AVL300, Monster's flagship system con-troller, utilizes RF wireless technology to work through walls, ceilings, and floors for multi-room control. In addition, the AVL300 is a powerful lighting controller and can help customize light-ing situations to set any mood. The AV100 shares the same functionalities of the AVL300 without the RF and lighting capabilities. Combining unmatched operational power with sim-ple Web-based setup and personalization, the Monster AVL300 and AV100 Controllers can master even the most sophisticated home entertainment systems, yet are friendly enough for the entire family to use. Additionally, the AVL300, along with the IlluminEssence Lighting System products, make it possible to intricately control lighting throughout the entire house. Sophisticate your home today with Monster. 415 840 2000. www.monstercentral.com.

Sony Electronics, Inc

Sony Electronics, Inc Designed exclusively for new home construction, Sony Electronics introduces two in-wall, home enter-tainment products for today's homeowner. The CDP-NW10 in-wall audio system and DVP-NW50 in-wall home theatre system can con-nect over most standard home computer networks to enable multi-room audio distribution as well as intercom and room monitoring functions. The sleek nine-inch square design makes this unit attractive in any room of the home, and because the units are installed during construc-tion, all unsightly wiring is concealed. For added cus-tomization, homeowners can purchase customizable center and side plates to match any décor. This incredible system allows you to listen to AM, FM, or CD audio as well as view widescreen movies with 5.1-channel theatrical impact. Liven your housewarming party with the Party Mode that allows you to spread wall-to-wall music throughout your home. Connect to your PC and you can browse and play your entire library of MP3 music files via any networked WallStation unit. Glamorize your new home with Sony's in-wall entertainment products. 800 222 SONY, www.sonynewhome.com.

SANUS Systems

SANUS Systems Dedicated to designing and building a broad variety of audio and video furnishings, mounts and accessories, Sanus Systems announces the launch of their new under-cabinet mount for small TVs, the VisionMount™ Model VMUC1. Designed to fit 9-inch to 17-inch LCD TVs with a total weight of 18 pounds, the sleek mount tucks discreetly beneath the cabinetry when not in use. Depending on the size of the TV, this unit has a swivel range of ±100 degrees. This model is made of heavy-gauge steel for strength and dura-bility, and comes in a stylish powder-coated silver finish. The new VisionMount Model VMUC1 offers homeowners a space-saving solution for crowded counters. Phone SANUS Systems toll-free at 800 359 5520 or visit their Web site at www.sanus.com.

Builder Award 2006 for energy-efficient home

NAHB Research Center Staff

synopsis

- *Forward-thinking builders are taking energy-efficient home design to new heights, by constructing environmentally-friendly, higher-performing homes to help temper steadily increasing energy prices.*
- *The home features outstanding energy performance and exemplary use of systems engineering in the HVAC system, building envelope, and renewable energy production.*

EVHA Builder Of The Year: AndersonSargent Custom Builder

Over the years, dramatic improvements have been made in the design of energy-efficient homes. Builder practices have evolved from the "built to breathe" homes of old with virtually no insulation and leaky, single-pane windows, to the well-insulated, tightly-constructed homes of today. Fortunately for homebuyers, some forward-thinking builders are taking energy-efficient home design to new heights, by constructing environmentally-friendly, higher-performing homes to help temper steadily increasing energy prices. One such builder, AndersonSargent Custom Builder, of Waxahachie, Texas, decided over 20 years ago that energy-efficient home construction is the only responsible way to build.

A pioneer of energy-efficient home building in Texas, AndersonSargent was recently named the 2006 EnergyValue Housing Awards (EVHA) Builder of the Year; as well as winning the Gold Award for custom homes in the hot climate category for its innovative zero-energy concept home in Dallas. Sponsored by the U.S. Department of Energy's Building America program and presented by the National Association of Home Builders (NAHB) Research Center, the EVHA is the residential building industry's preeminent award for energy-efficient home construction. AndersonSargent's zero-energy home's exceptional energy performance made it the front-runner for the award. The home won in the Custom Home, Hot Climate category. According to the EVHA judges, it's not only a "truly beautiful home" but it's a "world-class project." The judges were impressed by the home's outstanding energy performance and its exemplary use of system's engineering in the HVAC system, building envelope, and renewable energy production.

To construct the award-winning home, AndersonSargent worked with the Building America program to dramatically reduce energy loads and to incorporate renewable energy production in the home's design via rooftop solar panels. Standing above the crowd, the home not only features state-of-the-art energy-efficiency and green building technologies, but also includes eight kilowatt (8 kW) hours of solar power capacity that is designed to offset the home's energy consumption. When there isn't enough direct sunlight to run the house, supplemental electricity is provided by the utility. When the system produces excess power, the excess electricity is fed into the utility grid, and the meter runs backward.

"We found that we could build a home out of fairly conventional materials, but with more care, those homes would cut utility bills by 50 to 70 percent over standard construction practices in our area," said Jim Sargent, partner at AndersonSargent Custom Builder.

The builder chose many unique materials and methods, including an extensive array of "green" products, for the residence, which was the first zero-energy home in Texas. Its walls are constructed of insulating concrete forms made with recycled waste wood that provide an R-value of 14. Through passive solar design, the home obtains much of its heating and lighting from the sun; excess solar energy is stored in its plaster walls, concrete floors, and interior masonry. A light-colored exterior, combined with a reflective roof, mitigate intense summertime heat.

Two roof-mounted solar collectors also provide hot water and hydronic heating. The energy is stored in a 105-gallon storage tank, with supplemental energy provided by a tankless gas water heater. An on-demand hot water recirculation system rapidly provides hot tap water with the push of a button—a system that offers convenience, reduces the waste of water, and provides superior energy efficiency over conventional recirculation systems.

Critical to the home's performance are ducts that were carefully planned to be completely within conditioned space and to provide balanced airflow throughout the home. To simplify the process, the builder used open-webbed floor trusses and spray foam insulation at the roofline to create an unvented attic.

Ninety percent of the lighting fixtures are pin-type fluorescent bulbs that cannot be replaced with standard incandescent lamps. Fluorescent lights reduce energy consumption and lighting heat by about 75 percent. In addition, the passive solar design optimizes natural daylight to reduce electrical lighting needs.

"...the home not only features state-of-the-art energy-efficiency and green building technologies, but also includes eight kilowatt (8 kW) hours of solar power capacity that is designed to offset the home's energy consumption."

AndersonSargent Custom Builder, LP Specifications

Wall (and roof) construction: R-14 insulating concrete forms

Windows: Double-pane, low-e, gas-filled, tinted; U-0.38, SHGC 0.29

Ceiling Insulation: R-30 spray foam insulation at roofline

HVAC: Hydronic heating; 17 SEER chilled-water air-conditioning system; fresh-air intake to blower with timer control

Ducts: 100 percent in conditioned space; sealed with mastic

Water heating: 64-square-foot flat-plate collector with sealed-combustion tankless gas water heater backup

Lighting: 90 percent fluorescent

Appliances: ENERGY STAR®-labeled refrigerator, washer, and dishwasher

Blow door test: 0.11 ACH50

HERS rating: 94.5

Innovative features: Metal roofing with infrared reflective paint on vented cavity; 8 kW photovoltaic system; low-flow faucets and showerheads; recirculate cooled water back to the water heater; passive solar features; rainwater collection system; chilled-water cooling

Anderson/Sargent Custom Builder would like to thank:

- James Hardie Siding Products
- Durisol
- Whirlpool
- KitchenAid
- Building Science Corporation
- American Clay
- Energy & Environmental Building Association
- Integris Metals
- The Icynene Insulation System
- Pella

"The concept is simple," Sargent says. "By using clean, renewable energy sources that reduce pollution and help sustain a healthy environment, the zero-energy home is the future of the American home."

Don't be misled by all the green jargon, this home is certainly no new-age tree house. Aside from being extremely energy efficient, the two-story, 3,800-square-foot luxury house includes a number of modern amenities, including a screened porch, deluxe outdoor kitchen, and a 2.5-car garage. Construction costs, including the renewable energy systems and many green building features, were about $171 per square foot.

With a reputation for quality and energy efficiency, AndersonSargent maintains an approximate two-year waiting list of clients. "Our home performance became so well-known that we were able to remove marketing from our annual budget."

EnergyValue Housing Awards Program

The EnergyValue Housing Awards (EVHA) program serves to educate the home building industry and the public about successful approaches to energy-efficient and environmentally-conscious construction practices. Now in its eleventh year, the EVHA is a program of the NAHB Research Center in partnership with the National Association of Home Builders, the National Renewable Energy Laboratory, and the U.S. Department of Energy/Building America Program. The program was developed in cooperation with sponsors: Broan-NuTone LLC, BuildingGreen, Honeywell, OG&E Electric Services, U.S. GreenFiber, and The Vinyl Institute. The awards honor builders who voluntarily incorporate energy efficiency into all aspects of new home construction. Builders across the nation submit detailed applications in any of five categories (Affordable, Custom, Factory-Built, Multifamily, and Production) in one of three climate regions (Cold, Moderate, and Hot). A panel of industry experts evaluates the applications and selects winners based on Energy Value, Design, Construction, Marketing and Customer Relations, and Energy Programs. Entries for the 2007 EVHA are now being accepted. For additional information on the EVHA and zero-energy homes, or to apply, visit www.nahbrc.org/evha. UHD

The Authors

The NAHB Research Center, located in Upper Marlboro, Maryland, promotes innovation in housing technology to improve the durability, affordability, and environmental performance of homes and home building products. Created over 40 years ago as a subsidiary of the National Association of Home Builders (NAHB), the NAHB Research Center has established itself as the source for reliable, objective information and research on housing construction and development issues. Through its various testing and certification services, the Research Center seal is internationally-recognized as a mark of product quality and an assurance of product performance. For more information, visit www.nahbrc.org.

LEED for HOMES

The First Optimum Performance Home™

site planning part III

Gary Reber

synopsis

- **At the core of The Sea Ranch concept is a set of guidelines for development with a strong sensitivity to environmental stewardship.**
- **The intent is to reduce the environmental impacts and harm to natural systems, enhance environments and human health, and avoid, minimize, and mitigate the adverse effects of modern construction practices.**
- **The Optimum Performance Home is designed to be a building that touches the earth lightly during both construction and day-to-day operations once built, respecting the beauty and diversity of the natural setting.**

Introduction

This is the third article in the series documenting the design and construction of the first Optimum Performance Home™. The project has been selected by the U.S. Green Building Council (USGBC) for inclusion in the national Leadership In Energy & Environmental Design (LEED®) for Homes pilot program, their new green build certification initiative. The hme will achieve LEED platinum-level certification.

The home will be built at The Sea Ranch, located in Sonoma County along the Northern California coastline of the Pacific Ocean.

The showcase project is exemplary of the "Ultimate Home Design™" concept, which integrates age-friendly universal design with the best sustainable building practices while exerting minimal impact on the environment. Universal design is the inclusive, non-discriminatory design of products, buildings, environments, and urban infrastructure, as well as information technologies that are accessible to and useable by (almost) all. With respect to home design, the idea is to design and build homes that have no physical barriers, thus sustaining people of all ages and all capabilities in a functional, comfortable, and aesthetic lifestyle.

A building science systems approach to home building is the cornerstone of the project with emphasis on the relationships between the home's components and the envelope they create. Also paramount is good stewardship—proper regard and respect for the rights of neighboring homeowners, resource efficiency, and the surrounding natural setting. The goal is to optimize occupant health, comfort, and safety; maximize energy efficiency and structural durability; and minimize environmental impact. In addition, the aim is toward providing a nurturing home environment to support independent living and sustainable lifestyles.

Part I of this case study series appeared in Issue 1, January/February 2006. The introductory article extended to 16 pages and covered extensively the project scope. Part II appeared in the March/April issue and focused on site planning and preparation. Part III expands on the approach to Low-Impact Development (LID) for the site.

The home design integrates all of the concepts advocated in *Ultimate Home Design*™. I conceived the "Optimum Performance Home" and "Ultimate Home Design" concepts, and had a vested interest as this would not only be my home but my office as well. My goal was to demonstrate how today's products and building methods can make life safer, more comfortable, and more enjoyable. The science of optimum performance homes is about building structures that use less energy, are quieter and more comfortable, have fewer problems with materials degradation, provide clean air and water, and do less damage to the environment. As an integrated holistic design, the house will serve as a home for many people and serve in many phases in one's life.

> "A frequent observation in the environmental design community is that codes and established methods often present barriers and restrictions on projects that are attempting to be more resource efficient or accommodate a better environmental 'fit.'"

DESIGN
optimum performance home

The Sea Ranch
Sonoma County, California

A Case Study

The approach I am taking with this series of articles on designing and building the Optimum Performance Home at The Sea Ranch is to present a case study, which details every

phase in the design and building of this platinum LEED home project.

For our readers who have not personally experienced such a process, we believe that this serialized documentation will be enlightening and beneficial to approaching your own home design and building project (see "The Architect's Role As Designer And Implementer" in Issue 2, March/April, 2006 and "So You Want A LEED® Home" in this issue).

Of course, this is our experience and not all aspects of our approach will apply to your project. Nonetheless, there will be aspects of our approach that will be educational and useful. I hope that, as a result, you will be rewarded with a better appreciation of the extent of commitment necessary to successfully design and build a new home with as much respect for the natural environment as this project demonstrates.

A frequent observation in the environmental design community is that codes and established methods often present barriers and restrictions on projects that are attempting to be more resource efficient or accommodate a better environmental "fit." And while this particular project must comply with a distinct set of guidelines and rules and pass before a design review committee, most green building projects will have a similar experience in adjusting to codes and going before planning commissions. In addition, members of planning commissions and design committees are frequently architects or design professionals themselves, and may have strong opinions about how a project should look or what the standard of practice should be.

Please understand that this is a real-life, real-time project, and, to date, we have yet to break ground and lay the foundations. Therefore, expect that some issues of *Ultimate Home Design* will have more coverage of this project than others, depending on the construction stage we are in at any given time over the course of the next year.

Site-Specific Design And Low-Impact Development

Gary Reber & Bill Wilson

At the core of The Sea Ranch concept is a set of guidelines for development with a strong sensitivity to environmental stewardship. These guidelines, which were thought out and incorporated into The Sea Ranch Declaration of Restrictions, Covenants and Conditions (CC&Rs), embody the principles that development of home sites are to embrace. These principles are expressed as design criteria and rules interpreted by three (six, including alternates) Design Committee members appointed by the property owner-elected Board of Directors of The Sea Ranch Association, a Common Interest Development.

Over the years, the implementation of the guidelines, which are, for the most part, subjectively interpreted, has resulted in greater demands on recent projects and their owners who have endeavored to design and build their dream homes under the same rules that applied to other property owners who engaged in the design process before them. As with any "planned" development, especially one sensitive to environmental impact, one should expect refinements to the subjectively interpretive design guidelines and rules over time, while adhering to the founding principles expressed in the CC&Rs. The impact is that property owners in the design process are subject to new interpretations, rules, and limitations that were not imposed on homeowners who bought property and made plans under earlier interpretations of the guidelines, particularly now that the development is in the build-out and "infill" stage. As well, precedents may be applied differently than in the past. The Optimum Performance Home project could be argued to be a microcosm of the design and building challenges facing participants as the development approaches build-out.

DESIGN
optimum performance home

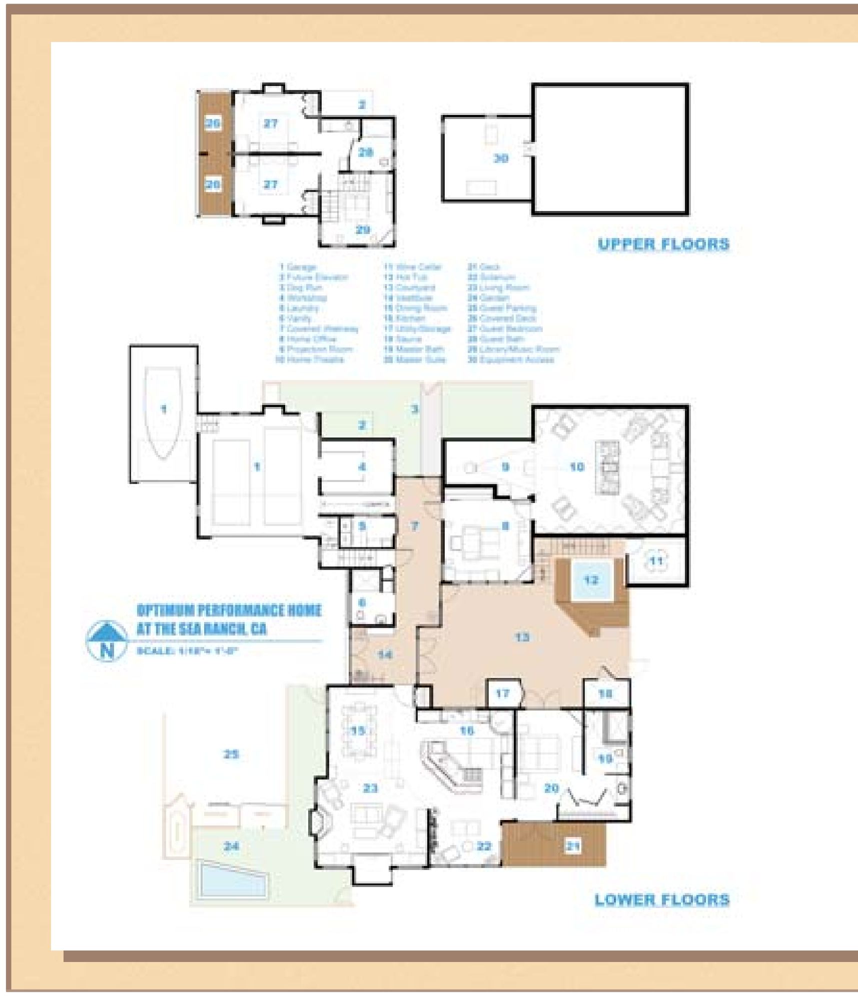
During the last few years, new thinking about the use of sustainable and renewable materials and building science approaches and techniques, and on-site energy generation, have been taking hold on a national level. This new thinking is the future of environmentally-responsible housing development, aimed at better stewardship of Mother Earth. The Sea Ranch planners and designers are faced with this new reality, which is challenging them to expand their thinking and application of the long-standing guidelines, which were envisioned to protect The Sea Ranch concept from degradation of the natural environment and the perceived blight of typical subdivision development, done without regard to good site-specific design.

When one purchases a lot at The Sea Ranch, one must assume, as does the community, that responsible property owners will respect and adhere to the philosophy and requirements of the Design Manual and Rules, as well as The Sea Ranch CC&Rs, which read:

"It must be assumed that all owners of property within The Sea Ranch, by virtue of their purchase of such property, are motivated by the character of the natural environment in which their property is located, and accept, for and among themselves, the principle that the development and use of The Sea Ranch must preserve that character for its present and future enjoyment by other owners.

"It is also assumed that those who are entrusted with the administration of The Sea Ranch will discharge their trust in full-recognition of that principle and, to the extent consistent therewith, will foster maximum individual flexibility and freedom of individual expression."

It has always been the intent in designing the Optimum Performance Home at The Sea Ranch to respect and adhere to the philosophy and



requirements of these documents in terms of natural settings, simplicity and modesty of development, and sustaining the predominance of nature.

With respect to the preservation of the character of the natural environment, the guiding principles in the environmental design and site preparation and development has been to employ resource-efficient sustainable design and development practices. The intent has been to reduce the environmental impacts and harm to natural systems, enhance environments and human health, and avoid, minimize, and mitigate the adverse effects of modern construction practices.

Just as the Low-Impact Development (LID) design features seek to foster a healthier watershed and, hydrologically speaking, approach "zero impact," so is the intent to improve the energy performance of the proposed home in such a manner that it effectively will be nearly a net "zero-energy home." To accomplish these twin goals, site design includes saving indigenous trees and unique natural vegetation, constructing on-site storm water retention/infiltration features to integrate with the natural hydrology, orienting buildings to optimize solar resources, use of active renewable energy systems, optimizing passive solar design, and making water and energy conservation choices in fixtures and appliances.

The Optimum Performance Home is designed to be a building that touches the earth lightly during both construction

and day-to-day operations once built, respecting the beauty and diversity of the natural setting.

These measures are at the center of designing and constructing green homes that satisfy the human physical and psychological need for contact with nature. At the core of the architectural design of the Optimum Performance Home is a built habitat that is full of daylight, sunlight, natural fresh air ventilation, outdoor views, and indoor and outdoor green spaces—a habitat that achieves a harmonious relationship between its occupants and the natural environment.

(Please see Julie Stewart-Pollack's introductory article in this issue on biophilic design to achieve direct, indirect, or symbolic contact between people and nature in the built environment. Biophilia is the idea that people possess an inherent affinity for nature, and when applied to the built environment, it enhances people's physical and mental well-being through positive connections to the natural environment.)

Environmental Plan Options

Our approach, in essence, strives to adapt the planned development to the background hydrology at the site, the regional hydrology that affects the site, and the site's position in the overall watershed. (See Bill Wilson's article in this issue entitled, "Watershed Planning & Low-Impact Development: The Challenge Of 'Fitting-In.'") The ultimate goal in utilizing this approach is to balance necessarily impervious surfaces such as building roof area with enhanced infiltration and storage of rainfall and runoff, eliminate unnecessarily impervious areas like driveways and walkways and replace them with pervious paving, maintain high water quality, enhance infiltration and groundwater recharge, enhance interflow, and maintain the incremental contribution over time to the base flow of regional streams.

Another aspect of the type of watershed planning that is expressed in the overall proposal for the Optimum Performance Home at The Sea Ranch is that the various components of water use are not looked at separately, as is the common practice, but are analyzed and coordinated in an integrated manner. This integrated analysis includes uses of piped or potable water in the household, uses of water in the landscape, water conservation, wastewater, possibilities for water harvesting or recycling, enhancement of site and regional hydrology and habitat, and beneficial management of storm water and runoff using LID methods that seek to mimic natural hydrology.

Thus, the selection of water-saving fixtures in the home will greatly reduce the amount of potable water consumed, which will reduce the amount of wastewater produced. The wastewater in turn will be intermittently dosed to The Sea Ranch-approved off-site leach field on designated commons over the entire 24-hour day rather than in large batches, as is usually done. These small micro-doses will allow the soils in the leach field to dissipate the effluent evenly and by capillary action, and enhance the ability of soil organisms to polish the effluent, and for soil porosity to recover and maintain aerobic conditions. This intermittent dosing method also makes more effluent available for uptake in the root zone and by surrounding trees and plants.

A cistern is planned to retain roof runoff from interior roof areas, and these will be guttered. On other eaves, Rainhandler® grids are planned to shatter and re-suspend roof runoff, spraying it to the adjacent mulched landscape areas to facilitate infiltration. All impervious roof surface areas that produce runoff are mitigated. The entire landscape is planned as a permaculture system, with mulch covering all surface areas, and all levels utilized by native plants, including the ground covers, and the understory, middle story, and tree canopy.

Because of the unique hydrology of the site, it is anticipated that the background moisture and retention methods inherent to the permaculture system will support a higher order of landscape over longer periods between rainy seasons, with minimal supplemental irrigation. This landscape will, in turn, interact with the LID elements necessitated by the seepage and shallow groundwater to produce greater habitat value, lush perimeter screens, and provide a sort of botanic refugium for a number of native bulbs and plants that are much rarer in the thick forest and dry meadows generally found at The Sea Ranch. Thus, the landscape plan aims to effectively limit water and energy demand while preserving and enhancing the natural environment.

In summation, an LID plan seeks to distribute runoff at every opportunity, as close to the source of the runoff as possible. In contrast, conventional drainage planning generally collects runoff from different sources and discharges it off-site through a pipe, or more recently with some sort of accommodation being made to water quality and detention requirements, such as a detention basin or infiltration trench.

Since LID is a distinct departure from the conventional drainage plans that have previously been implemented on The Sea Ranch, in which runoff is directed to the drainage in more direct ways, and because of the unique hydrology of the subject parcel, the proposed LID environmental plan requires consideration and study to form an impression of how the integrated systems will work and to better understand the project in context. It is admittedly difficult to derive this kind of information piecemeal from a set of finely-scaled drawings. In appreciation of this, the following will attempt to clarify the elements of the environmental plan that were presented to the Design

Committee during the current Final Construction Plan submittal stage. The current status of the project is Preliminary Plan approval with conditions for Final Construction Plan approval. Following a final plan submittal, the Committee issued a letter dated February 2, 2006, which contained issues that the Committee wanted us to address. What follows is our response to their issues.

Screening And Reduction Of Apparent Building Mass

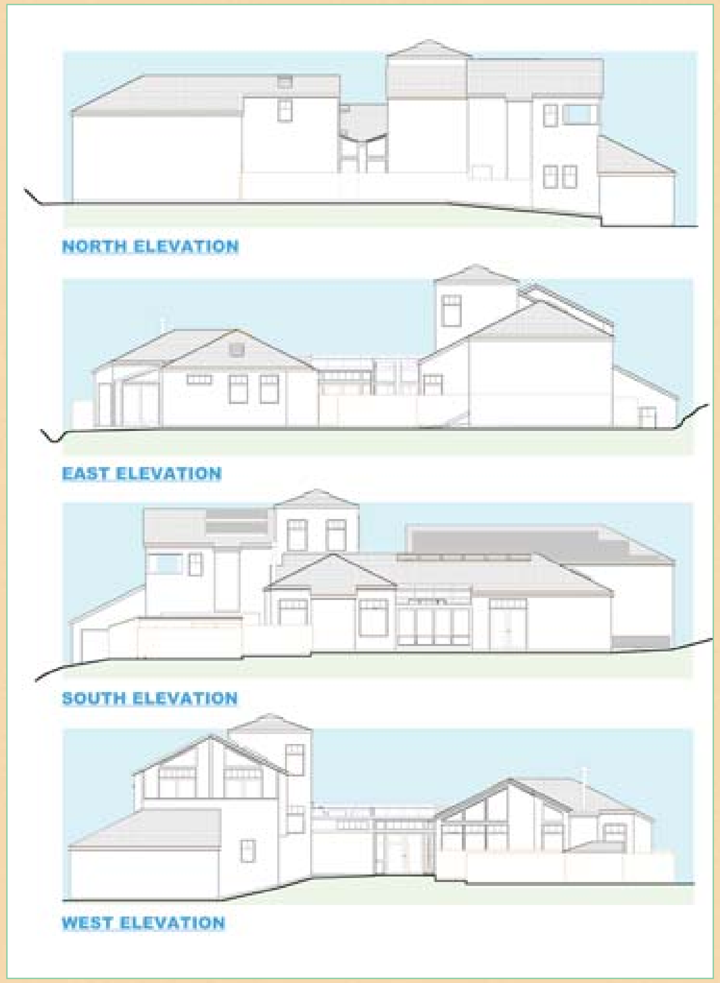
Two mitigating elements were requirements of the Design Committee in the Preliminary Plan approval stage: a) "the visual screening of the development provided by both existing and proposed on-site vegetation," and b) "the reduction of building mass provided by 'digging' the structure into the grade at the east side of the lot."

It should be noted that the site was originally host to a dense overstory of mature pines, which had become blighted and damaged. Many of them blew down two years ago, and the property was designated a windthrow area, with a special directive to remove damaged and hazardous trees and to not replace them with inappropriate species in future plantings.

The other major constraint has been the generally wet condition of the site, which is subject to sheet flow from adjacent properties as well as having groundwater moving across the bedrock, only five or six feet below the surface. To deal with this, a curtain drain or French drain was designed that would, along with a very gentle reshaping of the topography, intercept the sheet flow and groundwater and direct it around the building pad.

Once the water reaches the front of the building, Infiltration chambers were designated for shallow burial across the front of the property, in an open area between the house and the frontage trees and shrubs. This band of Infiltration chambers would provide an optimized way for excess water to be re-integrated with the groundwater and the natural gradient, and actually correct a pre-existing problem that contributed to the downing of several large pines and the nearly continuous saturation of parts of the surrounding area and frontage.

Unfortunately, the use of the Infiltration chambers and their location relative to the remaining understory tree screen across the frontage was not clearly understood at our Final Construction Plan submittal, leading to the following exchange:



The elevations of the Optimum Performance Home at The Sea Ranch

a) Frontage screening and operation of the Infiltration chambers

The Design Committee recognizes "that due to both forces of nature and safety management efforts" that we conducted following the designation of the lot as included in the Windthrow Hazard Area, "a significant amount of the on-site vegetation has been removed, leaving the site exposed to view from the road. Though an extensive replanting plan is proposed as required by the Committee, the location of the proposed Infiltration chambers along the road-front property line (the entire width of the parcel) jeopardizes the remaining existing trees and the

feasibility of the replanting proposal, and thus their screening capabilities. It is also noted that there is no provision of a specific planting plan where individual plant specimens are located, identified by species and size, and provided with deer screens and drip-irrigation system to promote survival. It is critical that the site be reforested per the Roberts revegetation plan to ensure that the bulk and scale of this home be screened as originally intended." The reference to the Roberts revegetation plan is a reference to the Design Committee-adopted Vegetation Management Plan. For a complete look at this document, please see The Sea Ranch Web site at www.tsra.org.

The reference to "the site exposed to view from the road" relates to a portion of the road when driving north, and this observation actually involves adjacent private properties butting up to the site that are also included in the Windthrow Hazard Area, with a significant amount of the on-site vegetation removed.

In response, the Design Team pointed out that the band of Infiltration chambers that is planned across the property frontage is part of the integrated system designed to balance the perched shallow groundwater, seepage, and sheet flow that move across the property from the neighboring south and east properties. The purpose of the Infiltration chambers is to work in concert with the French drain that will intercept groundwater behind the house and return it to the groundwater in front of the house.

The shallow French drain that has been designed for the cut house pad immediately behind the house is the least disruptive method for intercepting the groundwater, seepage, and sheet flow that cross the property from the adjacent properties. The other option is to construct a curtain drain from grade to at least one foot in depth into the bedding formation, which is generally about six feet below grade across the site. This would result in a trench approximately eight-feet deep across the site during installation, with appropriately sloped sides—a considerable excavation.

This brought up the issue of an earlier rendition of the home design (depicted on the approved Preliminary Plan) that showed it as earth-banked to set it deeper into the ground and reduce the apparent bulk in the now-deforested landscape. The drawings submitted for final approval changed the earth-banked option to one that included a cut pad at the same elevation and depth into the ground as the earlier version, but instead sloped the ground away from the foundation in the rear portions of the home that were below native grade.

The reasons for selection of the sloped grade adaptation behind the house pad cut, instead of the earth-banked design originally contemplated, were as follows: Our desire was to minimize slope disturbance, as well as to minimize soil disturbance and erosion, and to better protect the building materials from the hydrostatic pressure and potential long-term damage due to the constant moisture. Part of the decision included a determination that construction of the deep curtain drain would, in balance, be just as disruptive as the extension of the house pad cut by a few additional feet, and would result in a less reliable method of protecting the home and building materials from the continuous presence of groundwater and seepage. This was arrived at based on the geology and soils report provided by Keith Colorado, EIT, a project engineer with BACE Geotechnical, based in Santa Rosa, California.

In addition, with either option, the pad cut would have to be cut back as shown regardless of whether or not the ultimate construction would be earth-banked in order to construct the foundation, and then backfilled with engineered fill.

The Infiltration chambers are to be carefully installed and set back toward the house from major tree roots and the existing screen of trees and plants that currently exists at the site. The trench bottom is to be shot dead level (with a transit), so that any excess water that is introduced to the Infiltration strip will redistribute evenly across the site, and infiltrate back to groundwater, which is perched across the site at approximately five-feet below grade at the boundary of the overburden and bedding formations. The trench bottom for this Infiltration strip will be approximately 2.5- to 3.5-feet below grade.

The Design Committee correctly noted that the subject property is a windthrow property and has been heavily impacted by the maturation and subsequent collapse of the inappropriate tree cover that was originally planted by the developer of The Sea Ranch, several decades earlier. Removal of these large naturally damaged and diseased or fallen pines has opened up the site considerably. However, there is still a screen of understory trees and shrubs along the frontage, and the landscaping plan includes preserving and building upon this base and developing similar screens along the southern, eastern, and northern property lines. The native understory trees, shrubs, and ferns that remain will form the basis of the palette for development of the side screens, augmented in particular by native rhododendrons and dogwoods, which are generally available from nurseries in larger sizes.

The Design Committee expressed concern that the installation of the Infiltration chambers somehow will be deleterious to the remaining screening shrubs and conflict with the establishment of the landscaping plantings. To the contrary, the Infiltrators are to be installed between the frontage screen and the residence, outside the drip line of any trees, and without damage to

DESIGN
optimum performance home

Current view of site looking south from road with tree screening in place

Current view of site looking north from road into interior of site after tree clearing due to windthrow conditions

any supporting root laterals. As with all aspects of this project, a great deal of care and attention will be placed in the construction of the home. The intent and design of the Infiltration chambers is to preserve the native hydrology and enhance groundwater recharge, and this will prove beneficial to the landscape, existing or planted, rather than detrimental.

The Vegetation Management Plan (the Roberts vegetation plan), for management of windthrow properties, has been closely studied and adhered to in the careful environmental design of this site. The Vegetation Management Plan clearly supports the use of understory trees, such as willows and wax myrtles, in the manner in which the site's environmental plan intends to establish them, as well as the selection of redwoods for the rear of the property to the east. (See Vegetation Management Plan blowup of the subject lot with a legend indicating the types of vegetation permissible.)

In addition, the Vegetation Management Plan recommends against such screening trees on wetter properties, and the interception of cross-site sheet flow and seepage will actually help to preserve the remaining frontage vegetation, which is subject to extended periods of soil saturation. The integrated system for handling this cross-site water, including the Infiltrator chambers, will eliminate the present condition, in which sheet flow overflows and onto the street along the entire Fly Cloud Road frontage, along which the site is located. This sheet flow begins on the property to the south of the subject site, and is present for much of the year, creating saturated soils around the entire existing screen of trees and shrubs.

The existing frontage plantings consist of a mix of Douglas firs, madrones, myrtles, laurels, and ferns, with some pines (targeted for removal) remaining in the overstory. As expressed in the landscape plan, the frontage screening is to be enhanced by infilling this remnant screen with dogwoods, maples, rhododendrons, and azaleas, and a lush understory of ferns and native irises. Except for the driveway entry, the goal is to completely screen the home to well above eye level. Additional screenings are designed for the areas between the Infiltration chambers and the house, creating multiple layers and a very effective visual masking of the home itself.

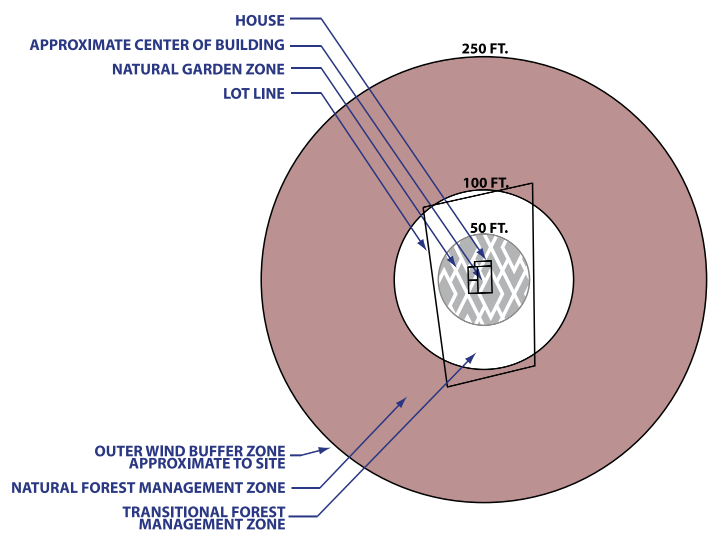
The landscaping is expected to require only spot irrigation during the late summer and during the hot period, usually occurring in the fall for the first two years, and then be self-sufficient.

b) The building pad and rear exposure

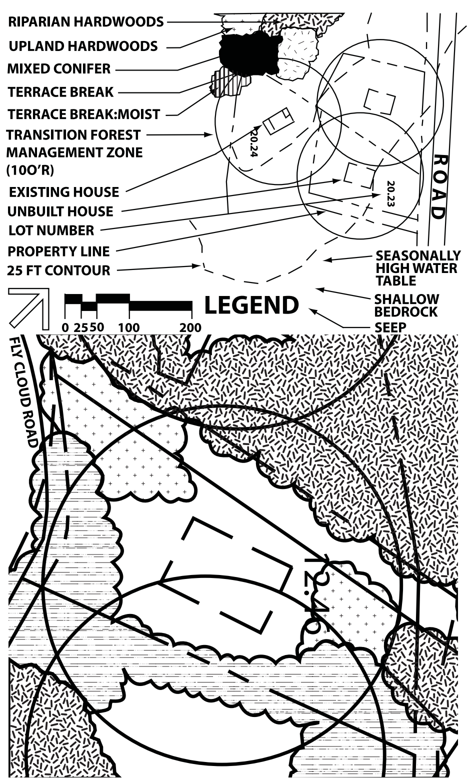
A level "pad" is to be created below the building footprint as part of the age-friendly universal design requirements for the residence, regardless of whether the walls of the home are exposed or earth-banked. Instead of the Preliminary Plan proposal showing an earth-banked building edge, the Design Committee correctly pointed out that the Final Construction Plan shows "a cut bank at the uphill side...pulled away from the edge of the building and steeply sloped (or terraced) back up to meet natural grade." The Committee noted that "this excessive proposed grading" had not been presented to the Committee on earlier submittals approved by the Committee, and that "this approach is in strong contrast to the site development philosophy at The Sea Ranch as described in Section 7.1 of The Sea Ranch Design Manual and Rules," which reads:

"Since it is expected that the design of the house will be tailored to the site, not the site to the house, excessive lot grading is discouraged and usually not allowed." And: "Appropriate grading will

REVEGETATION ZONE DIAGRAM



OPTIMUM PERFORMANCE HOME™ SITE
VEGETATION MANAGEMENT PLAN



Selected Species Recommended In The Vegetation Management Plan For Planting At The Optimum Performance Home™ Windthrown Site

Trees
Vine maple, Bigleaf maple, Red alder, Pacific madrone, Chinquapin oak, Pacific dogwood, Tanoak, Red willow, California nutmeg, Douglas fir, and Redwood

Shrubs
Holly-leaved barberry, Blue blossom, Toyon, Oceanspray, Labrador Tea, Bush Monkey Flower, Wax myrtle, Coffeeberry, Rhododendrons (California rose-bay and Western azalea), Red flowering currant, Wild Rose, California blackberry, Red elderberry, and Huckleberry

Vines
California honeysuckle and Common snowberry

Ferns
Five-Fingered Fern, Lady Fern, Deer Fern, and Chain Fern

Ground Covers
Wild Lilac and Sand Strawberry

Low Growing (Herbaceous/Perennial)
Wild Ginger, Giant Horsetail, Douglas iris, and Monkey Flower

minimize site disturbance, retain the maximum amount of undisturbed topsoil, avoid major excavation, avoid significant engineered cut or fill slopes, and avoid creation of depressed floor areas or low areas of poor drainage that will negatively impact existing vegetation, impede growth of new plantings, or create future drainage problems."

As noted previously and here again stressed, it has always been the intent in designing the Optimum Performance Home to respect and adhere to the philosophy and requirements of this document, as well as The Sea Ranch CC&Rs.

Please know that during the design process, the Design Team and the Rebers have been viscerally committed to the philosophical underpinnings as well as the practical and regulatory aspects of The Sea Ranch CC&Rs and all design guidelines. The design of the building pad was undertaken specifically to "build to the site," to not involve excessive grading or excavation, and to not involve engineered slopes or excessive fill. This includes the following elements of the plan:

• The design plan is to preserve native topsoil and hold any graded topsoil aside for replenishment of areas that have been damaged by the tree removal activities and any areas exposed during construction. Just the tree removal has resulted in an almost completely disturbed site, and the plan anticipates mixing cut soil with mulch, spreading it in a thin layer, and re-establishing regenerative topsoil.

• The entire water handling system is designed to alleviate existing problems at the site, which were to some degree responsible for the downing of major trees and are even currently impacting the paving materials of Fly Cloud Road.

• The drainage plan is designed to positively impact existing vegetation and foster beneficial growth in new plantings by removing excess saturation, while preserving ambient soil moisture and healthy topsoil conditions.

• The drainage system is designed to deal with the existing problem at the site and prevent future drainage problems.

• In a very elaborate and detailed way, the house is "tailored to the site, not the site to the house."

The rationale for not earth-banking the building is elucidated below:

• The environmental and geological analysis of the site revealed a thin-perched groundwater gradient beneath the property, at the boundary between the terrace deposits that comprise the topsoil and overburden, and the bedding formation that composes the bedrock. There is also sheet flow and infiltrating water that originates on the properties to the east and south.

• A hydrologic plan has been developed to intercept the water that moves across the house site, transfer it around the house, and return it, through Infiltration chambers, to the natural hydrology in front of the house, using a pond as a stabilization feature on the whole system. This should effectively address the movement of water from the neighboring properties across the site, providing a dry pad, while at the same time maintaining the existing natural hydrology.

• Following the environmental assessment and geological investigation of the lot and surrounding area, it was decided that due to the hydrological regime of the site it would be extremely challenging to construct an earth-banked building and insure that it would remain dry and sound over time.

• It is very difficult to engineer durable moisture protection into a building that is subjected to constant hydrostatic pressure, as would be the case in this instance, and guarantee the future preservation of the building materials.

• The bank that would be created at the rear of the home is not an engineered cut, nor is it a steeply sloped barren scar or retained wall. The sloped bank to the rear of the house will not be retained or faced in any sort of formal way, but will rather be incorporated into the landscape plan and intermittently spotted with natural boulders. Native ferns, rhododendrons, and bulbs will be planted in between the "randomly" placed rocks. Because of the moisture in the area, this should produce a lush natural transition from the house pad to the natural landscape behind the house.

• The earth-banking of the home would require the construction of a curtain drain from grade to bedrock across the back of the property, which would disturb just as much of the site as construction of the banked option, but without the reliability, in terms of drainage, that exposing building materials at the rear of the house provides. The shallow combination French drain/foundation drain that has been designed covers all of the requirements in a less-intrusive manner.

• The construction of the foundation would have entailed the complete removal of all soil materials down to the bedding formation, replacing them with engineered fill. The lowered pad allows for conventional footings that are tied into the bedrock, without the excessive excavation and fill that would have otherwise been necessary.

• The view of the home from the north will be across existing grades, masking any impression of a "cut" and making the rear of the home seem shorter and actually "earth-banked" and sunken into the landscape. The same will be true for views from the neighboring properties to the north, south, and east, which will view the home through landscaping from a down-slope angle, again making it seem "sunken" into the terrain. The desired visual effect, of reduced bulk, will be the same as it would be in an earth-banked design.

• It is the intention of the Design Team to set the home down somewhat into the slope of the site and create a completely naturalistic return to native grade at the rear of the house, making it attractive both to the residents and to any incidental views from adjacent areas, while dealing with the other environmental challenges that the site presents.

• One of the factors that has influenced the design is the easement for power lines along the entire northern property line. This necessarily has pushed the home over to the southern side of the property. This creates a false impression that the lot is smaller in size than it actually is and that the home is larger than it actually is. In reality, there is a significant belt of open space along the entire northern side of the property. This affects the impression of the size of the proposed pond also, when one is simply dealing with a two-dimensional plan drawing and not considering the site as a whole.

We hope that the preceding explanation helps to clarify the interaction between the intended house pad, the drainage issues encountered, and the placement and function of the Infiltration chambers.

The Pond

The Design Committee has expressed concern that the proposed pond "may pose a safety risk...the pond and stream now become major features of the site." Further, the Committee stated: "their proposed locations at the high side of the lot are contrary to the patterns of nature and appear artificial and 'forced.' In addition, the grading plan implies over a six-foot total depth posing a risk to both humans and animals, and potential liability issues."

In response, we pointed out that the design of the proposed pond intends to both celebrate and accommodate the excess presence of moisture moving

across the site, and originating on the property to the south, which drains surface runoff from what appears to be surfacing perched groundwater somewhere on that site. In reality, the pre-existing site conditions created a pond at the house site. In addition, the pond is designed to act as a hydraulic stabilization feature by storing and managing excess moisture crossing the site, including some of the perched groundwater, and to create habitat value for native and migratory wildlife.

At the time of the Preliminary Plan approval, the engineering for the pond had not been completed and a smaller pond was shown on the site plan that was approved. In the Final Construction Plan submittal, the fully-engineered pond was shown.

The proposed pond, as designed, is 45 feet rim to rim and six feet in depth, with a volume of approximately 45,000 gallons, a little bigger than a standard backyard swimming pool. The bottom maintains a 30-percent slope, a configuration that is generally accepted as a safe slope in case of accidental immersion, with no sudden drop-offs. The free-board and top of the rim are sloped somewhat more steeply, to provide about a foot of free-water access around the rim to allow fish to predate any mosquito larvae that attempt to become established in the pond, and to provide for a foot of freeboard between rain events during the rainy season. A passive level control weir will regulate water level in the pond.

A "beach" with subsurface horizontal geotechnical drains (provided by Smart Drains) will be installed at the "upper" or southeast corner of the pond, overlain by coarse sand and rock chips, to intercept seepage and runoff from the neighboring property and recharge the pond. The "beach" will be perched at the freeboard limit, and will also act as a non-eroding overflow or bypass "spillway" for the pond, in the event that the pond is full and the level control structure is blocked, and water continues to come into the pond. Overflow that may occur this way would flow by the surface overland flow route along the existing, natural drainage course that goes along the southern property line of the site, with the modification that the upper part of this flow route will be set further into the subject property than it is at the undeveloped lot.

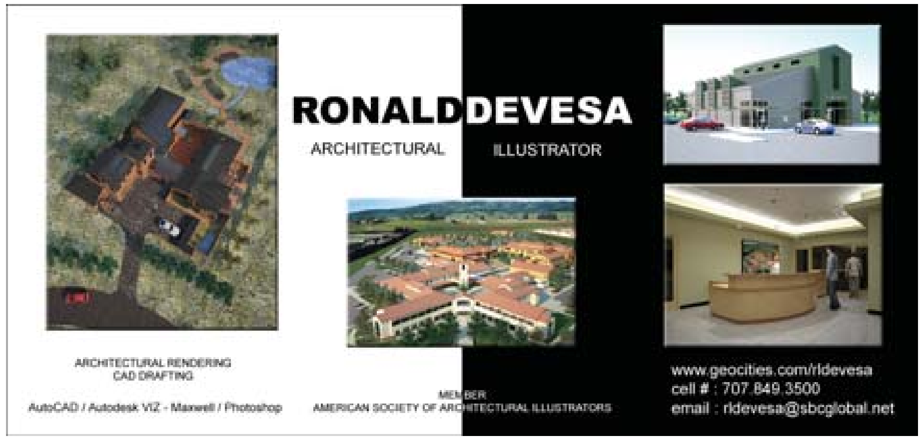
The recirculation stream water feature is to be a completely natural and landscaped functional element, without any visible non-natural materials, and with a natural and informal character, heavily landscaped with native bulbs, ferns, moss, and ground covers. The purpose of the stream feature is to continuously recirculate the water in the pond, providing aeration and nutrient removal from fish waste and from nutrients that may be present in the infiltrate. This will prevent algae formation and maintain high water clarity and water quality.

A gravel filter is to be installed on the bottom of the pond, consisting of a manifold of Infiltration chambers buried in gravel and rock chips. Water to feed the recirculating stream is to be drawn from this underdrain, as will overflow water discharged by the level control structure in the pond. Similar to an under-sand filter in a home aquarium, this will insure that water is drawn down through the pond bottom, removing particles and providing aerated water for resident bacteria, which will consume wastes and nutrients, and out compete algae that might otherwise become established in a stagnant pond.

The pond is to be stocked with native fish species, selected in accordance with State Fish & Game guidelines. The six-feet deep pond provides significant depth for the fish to escape from predators, including raccoons, herons and egrets. The pond's depth is sufficient to maintain cooler waters during the late summer, when temperatures in a smaller pond may become elevated.

The pond is to be constructed as a dip in the topography, without any constructed berm or engineered containment and sealed with a vegetable oil polymer (provided by Seepage Control) that is completely non-toxic and used for this purpose, and the pond will not leak. The pond is to be natural in appearance and completely landscaped with native wetlands plants and bulbs, many of which are now found at the site, and will be shielded or screened from neighboring properties. The pond is intended to be both entirely functional and to be a real amenity to the area, in affect making the best use of and actually augmenting a difficult situation in regard to excess moisture at the site.

During the dry months, it is anticipated that seepage will continue to recharge the pond. In addition, water collected from the French drain can be pumped to the pond, if there is capacity, and this is expected to be available year-round. There are hundreds of ponds in Sonoma County, with a wide variety of sizes and shapes, including several other ponds at The Sea Ranch and in the immediate area.



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Objections And Ambiguities

The above recommendations of the Design Team were presented in a letter to the Design Committee on February 10, 2006. A meeting to discuss these remaining issues and our approach was scheduled for March 3, 2006. At the commencement of the meeting, the the Committee members seemed unfamiliar with the site constraints and the written responses that had been provided and after two hours and forty minutes, there was no clear direction provided by the Committee. Three weeks later, by letter, the Committee stated they appreciated the opportunity to meet with us and reiterated that the purpose of the meeting was to provide us with an opportunity to present the rationale for the December 29, 2005, Final Construction Plan submittal and the January 19, 2006, revised site plan, which were denied by the Committee.

The Committee again expressed their concern for the proposed grading plan and water management scheme we proposed. They continued to perceive that the pull-back grading proposal "results in a level building pad that coupled with the high exterior walls [home theatre] contributes to the apparent bulk that in prior submittals had been visually hidden because the building was nestled into the site." No mention was made of the equivalency of the earth-banked and pulled-back grading options in setting the building down into the slope to diminish its visual impact, nor of the explanation that our revised grading plan was the better option to protect the natural environment.

It is now clear that the Committee will only accept the less than optimum earth-banked solution that was first indicated on the approved Preliminary Plan.

The letter also appears to read that the Committee will not approve the "natural" landscaping scheme we proposed related to the pond and the associated stream with rock and fern landscaping. To the Committee, our effort to adapt to difficult pre-conditions and restore a damaged piece of land seemed contrived, artificial, and "parklike."

With respect to the pond, the Committee stated: "the expanded size and depth of this feature constitute a major change from the plans that were the subject of the Design Committee's preliminary approval. The expanded pond constitutes a major alteration of the natural topography, which is inconsistent with maintaining the character of the natural environment as envisioned by the Restrictions and the applicable design criteria. In addition, the expanded pond raises hazard and liability issues...For all these reasons, the Committee cannot approve the pond as now proposed."

What is not clear is whether or not the Committee will approve the smaller-sized pond shown on the approved Preliminary Plan. Or, will the Committee not approve the pond even if it is redesigned to be smaller? This has not been made clear but we hope that the Committee will be open to approving the same size pond indicated on the previously approved Preliminary Plan.

For our next Final Construction Plan submittal, we will present a more detailed landscape plan, as requested, specifically showing the areas depicted on the John Roberts Associates "reforestation" plan and the details of vegetation we will plant in accordance with that plan.

Lastly, in the Committee's summary of issues discussed at our meeting, they stated: "Revisions of architectural plans were presented and discussed. Items discussed included: changes to openings/detailing of deck enclosure above garage; extension of roof over workshop and off of tower to accommodate elevator; use of rake windows and elimination of muntins; and, use and detailing of Hardipanel/battens/trim."

With respect to the stated architectural plan issues, the Committee did not say what they would or would not approve.

The Committee did not address any other issue with respect to the water management or Infiltration chambers proposed.

Thus, you will have to wait until the next installment in this case study article series to find out what happens. We are preparing to submit another Final Construction Plan to the Committee for review on April 21, 2006, in which we will hopefully satisfy the Committee and obtain final approval so that we can then proceed to file with the Sonoma County Building Department for their review of structural and Code issues, and finally obtain a building permit.

Conclusion

A geology report has been conducted and has been used to address the solutions to the problems presented by this site. The presence of groundwater is duly noted by the geology report. In addition, direct observations of the site have been made during wet and dry seasons for the past two years and used to develop this water-handling plan. The plan is directed toward improving conditions at the site to make construction of a home possible, and to mitigate the concentration of

water at the roadside and curb on the road. In return, the plan is designed to essentially intercept and redirect excessive site water around the home and return it to the natural hydrology, with the pond used to balance flows.

As always, our intent is to make this project consistent in every way with the spirit, philosophy, and diversity found at The Sea Ranch. Our commitment is to excellence.

We are in the Final Construction Plan submittal stage of approval with conditions. The outcome of the decision of the Design Committee to move forward with construction will not be known until after this article has been published.

The design review process for the Optimum Performance Home at The Sea Ranch is now in its fourth year (three-years, four-months as of April 2006). No one should have to endure such a lengthy process, but a check with other property owners and designers involved in other projects reveals that this is more common than not. As a case study, our project is instructive with respect to dispelling the often unrealistic expectations about the design process and the multitude of challenges facing leading-edge projects, and serves to educate prospective homeowners about the realities of building.

Moreover, the "indeterminate sentencing" that sometimes takes place before planning commissions is not unique to The Sea Ranch. Vague guidelines with subjective interpretations, changing personnel, and strong notions as to what constitutes good design lead to many projects getting "hung up." To add to the problem, most Boards of Supervisors do not give proper direction to their Planning Departments or work to clarify ambiguous design guidelines, resulting in a "tail wagging the dog" situation. To further complicate matters, there may be a subtle bias against "growth" and further development, even on vested lots. The inconsistency and constantly moving target can result in a frustrating experience for the prospective homebuilder.

No doubt, the process itself has weighed us down over this unexpectedly long period of time. But I want to assure our readers that while our resolve to overcome the many objections and challenges has been sorely tested, we are committed to achieving success in the building of the first Optimum Performance Home, even though it appears that extraordinary amounts of money and energy are still required to achieve our dream. UHD

The Authors

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Acknowledgements

Ed Rose is a residential architectural designer. His company is Rosebud Studios, based in Monte Rio, California. Ed has been designing homes and remodels on The Sea Ranch and surrounding areas since the late 1980's. His skill in listening to and understanding his client's architectural program and then translating that into a workable and pleasing design acceptable to the rigorous philosophy of The Sea Ranch Design Committee is responsible for the final successful approval of the First Optimum Performance Home™ at The Sea Ranch. This included the fairly new design concepts of universal access and aging-in-place, use of "green" materials, and meeting the exacting guidelines for a residential LEED® designation. It wasn't until Ed joined the Design Team that real progress was made with the Design Committee in this challenging process. Ed provided all of the images of the site plan, floor plans, elevations, and isometric perspectives for the magazine. His extensive education and experience span numerous disciplines from architecture to industrial and graphic design to technical illustration, photography, and painting. Ed can be reached at 707 865 1146 or 707 785 9180 or rosebud@thegrid.net.

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For more information on this advertiser, check 10

Watershed Planning & Low-Impact Development
the challenge of "fitting in"

Bill Wilson

synopsis

- As population and development have progressed, ever increasing volumes of runoff have been expediently funneled and channeled, and dumped into a "receiving body"—a regulatory term for what used to be known as a heritage of streams, lakes, bays, and beaches.
- In the course of the rapid development that took place in the 20th century, the ability of technology, urbanization, and growing populations to ignore and overwhelm geophysical conditions and biological communities created some consequences that are less than desirable.
- Low Impact Development (LID) as an alternative seeks to mimic the natural processes that remove pollutants from storm water before they are released into streams, rivers, lakes and oceans, and to bring disruptive increases in runoff quantity back into balance.
- The goal is to duplicate the watershed values of an established old growth forest.

Geophysical Watershed Conditions

Every site occupies a place in a watershed, whether the location is in a pristine mountainous forest or a flat, urbanized city. During America's frontier period and the opening of the West, explorer John Wesley Powell observed, "All living things are inextricably linked by their common water course." This statement acknowledges that in a very real and basic way, the basin formed by an individual watershed tends to form a natural system of unity and organization.

Technically, a watershed is the ridgeline of a drainage area or basin from which water flows, one direction from one side and another direction from the other side. One way to conceptualize a watershed is to visualize the ridgeline or peak of a roof. On a grand scale, an example of a technical watershed is the Great Divide, the crest of the Rocky Mountains in Western Montana encountered by Lewis and Clark, from which all streams on the eastern slopes flow to the Missouri, and then to the Mississippi Rivers, and eventually to the Gulf of Mexico, while streams on the western side flow to the Columbia River and Pacific Ocean.

But rather than being limited to a strict line of division delineated by a high point, the term watershed has been expanded to mean the entire area drained to a common body of water. Usually, the low point in a watershed, using the broader definition, is a creek, river, lake, bay, or ocean.

The passage of rainfall through a watershed is a vital part of the hydrologic cycle. During this journey, water interacts with the earth, and its life forms through a series of processes. These include deceleration; sedimentation, allowing for the removal of any particulates; filtration, through plants, roots, litter, and soil; infiltration, in which rainfall and runoff seep into the ground and eventually recharge the groundwater; and interaction with biological systems. Overall, this is a cleansing process.

In contrast to the interaction between landscape and geology found in a natural watershed, developed sites have generally been left out of the equation. Instead, commercial and residential landscapes are usually served by wasteful irrigation systems using costly potable water and isolated from the hydrologic process. The ground between plants is exposed and kept "clean" of litter and mulch, and drainage systems are installed to remove runoff and even excess irrigation. Roofs and pavements add to the discharge, which flows to storm-water collection systems of progressively bigger pipes.

As population and development have progressed, ever increasing volumes of runoff have been expediently funneled and channeled, and dumped into a "receiving body"—a regulatory term for what used to be known as a heritage of streams, lakes, bays, and beaches. This practice has been at the expense of the habitat, fisheries, and amenity value that they afford. Many streams no longer support fish populations simply because they have been "sluiced out" by high velocity runoff from collection systems during the rainy season. Stream flows then are apt to decline during dry seasons due to a lack of groundwater recharge.

Thus, in the course of the rapid development that took place in the 20th century, the ability of technology, urbanization, and growing populations to ignore and overwhelm geophysical conditions and biological communities created some consequences that are less than desirable. One of the more dramatic of these impacts has been the classification of hundreds of waterways in the U.S. as officially "impaired" by the U.S. Environmental Protection Agency (EPA).

A growing number of municipalities and regulatory agencies are taking steps to modify the typical way that drainage is handled. Prince George's County, Maryland, took a real lead in this regard with the development of bioretention as an

A growing number of municipalities and regulatory agencies are taking steps to modify the typical way that drainage is handled. Prince George's County, Maryland, took a real lead in this regard with the development of bioretention as an ethic and methodology in the late '80s, and their program is well established. In many areas, however, codes may actually dictate storm-water discharge to a collection system, and even when planning departments institute watershed-based goals and practices, it can sometimes be difficult getting a project through permitting departments and inspections due to staff unfamiliarity.

Low-Impact Development (LID)

In perspective, the discharge of drainage systems to the next unit downstream has been an experiment in civil engineering that has gone on for the better part of the last century and is now beginning to get a much-needed re-evaluation. With the realization that the methodology of this engineered approach is in need of revision, a growing methodology that uses the watershed as a basic unit of organization has developed, known as Low Impact Development, or LID.

LID provides both an approach and an expanding set of tools that can be mixed and matched to minimize the impacts of new development and redevelopment on the environment, and also correct some of the insults that already exist. To quote Landscape Architect Owen Dell from Santa Barbara, California, "Rain is not wastewater." Looked at in context to the way both storm water and wastewater have been handled in the recent past, LID takes its instruction from the way nature has done it for millions of years.

Low Impact Development as an alternative seeks to mimic the natural processes that removes pollutants from storm water before they are released into streams, rivers, lakes and oceans, and to bring disruptive increases in runoff quantity back into balance. In order for LID to be successful, it is imperative that it be thought of holistically and that all elements of the development process are integrated with each other. Designing to reduce ultimate impacts on the environment should also minimize any extra review by governing agencies and to keep the costs of achieving these goals at a level consistent with standard development practices.

> "Most driveways, fire access avenues, alleys, low-speed narrower streets, sidewalks, parking lots, and parking strips are 'unnecessarily impervious,' and can be converted to pervious by using a variety of surface options..."

If designed and implemented in this integrated way, runoff can be reduced, pollutants removed from the storm water, soils improved, landscape and habitat enhanced, stream beds and underground aquifers recharged, and stormwater fees and local and regional infrastructure costs reduced. In essence, the goal is to duplicate the watershed values of an established old growth forest.

Some Basic Tools

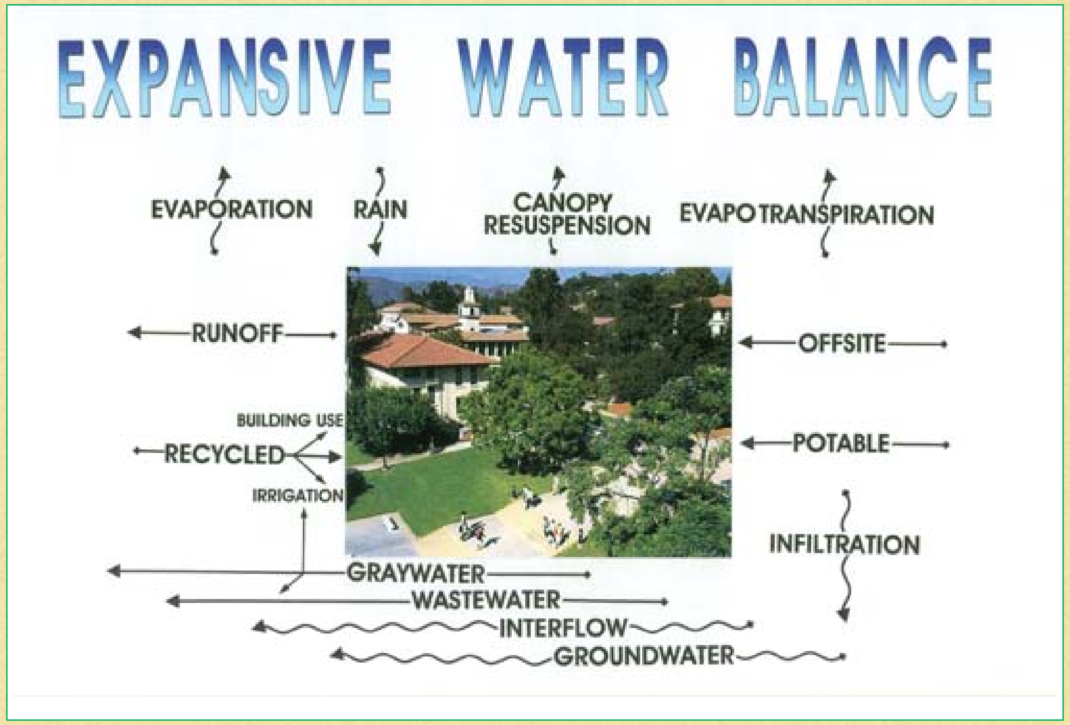
One way to look at conventional storm-water collection systems is to view them as a "vertical" rendering of the landscape. Beginning with roof gutters, rainfall and runoff are generally directed "downhill" and away from a site or area. To replace this, one basic approach is to instead emphasize the horizontal, organizing a site to accentuate topographic contours and continually intercept, spread, and infiltrate runoff. In the words of permaculturalist Dr. Bill Roley, the goal is "to make running water walk." This deceleration can be done in a number of ways, but the result is to intercept incremental amounts of runoff close to the source and direct it into either landscaped or specially prepared areas where it can be stored or infiltrated.

Another basic rule in water treatment is: "Don't first combine what you later want to separate." Deal with different sources of runoff in appropriate ways. Since removing pollutants from runoff to meet regulatory and environmental quality goals is both difficult and expensive, an effective strategy is to handle relatively high-quality runoff from roofs, sidewalks, and landscape in discrete systems rather than sending it out to the street, where it might be combined with all kinds of toxics. Then, a greatly reduced quantity of street runoff can be treated by downsized and less-expensive BMPs (Best Management Practices), including a wide array of treatment devices.

A third approach is to analyze impervious surface areas and determine what amount is really necessary. Instead of just impervious surface area/pervious surface area ratios, add a third category: Unnecessarily impervious area. Obviously, roofs are "necessarily impervious" and landscape is generally pervious. But most driveways, fire access avenues, alleys, low-speed narrower streets, sidewalks, parking lots, and parking strips are "unnecessarily impervious," and can be converted to pervious by using a variety of surface options, including several reinforced grass options, reinforced gravel options, pervious concrete, pervious asphalt, and pervious paving stones. Options in each type can be fully traffic-rated to meet fire codes.

Hydrologists use the term "effective surface area" to denote surfaces that produce runoff, and "ineffective surface area" to designate areas that do not produce runoff. Usually, a percentage is also assigned to describe an area that is "90 percent effective" or "50 percent ineffective." Another useful term in hydrology is "connected." An area that produces runoff is connected if it is part of a collection system that combines the runoff from effective surfaces and discharges them to the receiving body. Some sites, neighborhoods, and whole municipalities are close to being "100 percent connected." One of the goals of LID is to shift the balance toward more ineffective surface areas and disconnected impervious surfaces.

An extensive set of choices are available to produce a more disconnected area. These range from sloping asphalt parking lots into "rain gardens" and bioswales, to placing large diameter storm pipe manifolds under a parking lot to store runoff or infiltrate rainwater over longer periods of time, with numerous additional methods in between. Since the 1960s, a system in Japan has used pervious curbs and



gutters along roadways to infiltrate runoff as it is produced. The system now includes hundreds of kilometers of streets and roads, and has been extremely successful at reducing pollution, preventing flooding, and improving groundwater recharge. With the right mix of design elements, it is possible to greatly reduce negative hydrologic impacts, even in highly urbanized areas.

Water Balance

In working out a drainage plan for a site, it is common for the civil engineer to work out a water balance, which principally compares the difference between runoff and infiltration levels before development and those anticipated after development. To further develop this concept, the water balance can be expanded to include all sources of water moving through a project, whether from precipitation, offsite sources, groundwater, or pipes.

With this type of comprehensive water balance, a complete picture of the impact of a project on the dynamics of water can be considered. In most cases, potable water comes from water sources and a treatment plant far removed from the actual project site itself, and after a single pass is discharged as wastewater to a sewage treatment plant equally far. The partially treated wastewater is then discharged, causing additional affects, usually negative. Thus, while the usual inputs are rainfall, springs, streams, and offsite flows, and the usual outputs are through interception and uptake by plants and evapotranspiration, runoff and infiltration, the effects of imported or mined (in the case of groundwater) potable water, water harvesting, water recycling, and discharged wastewater can also be gauged.

The Sea Ranch Optimum Performance Home™ Site

The site for the Ultimate Performance Home™ at The Sea Ranch was discussed at length in Issue 2, March/April 2006. The principals discussed in this article were the basis upon which a comprehensive site development plan was planned. Please also refer to Editor-In-Chief Gary Reber's and Environmental Design Editorial Director Bill Wilson's article in this issue on the obstacles encountered with applying these principals and the plan specifics to the site development plan for the Optimum Performance Home to better understand the challenges that face designers and homeowners seeking to implement a low-impact development approach at The Sea Ranch. UHD

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biophilic design

Julie Stewart-Pollack, ASID, IDEC

"Biophilic design attributes are elements and qualities of the physical environment that connect us to the physical, psychological, and cognitive benefits derived from direct experiences with nature."

synopsis

- *A home designed to promote a high level of health and well-being would connect us literally to our ancient preferences for the patterns and rhythms of nature through a variety of biophilic design attributes.*
- *Because we now live almost exclusively in an artificial world set apart from nature, we are facing an extinction of experience through the loss of direct, personal contact with nature.*
- *This new design paradigm draws from many related concepts including restorative environmental design, humanistic sustainability, human-centered sustainable design, and the theory of supportive design, as well as pattern language and the nature of order.*

A Transformation In Home Design

Imagine a home designed to respond to your deepest needs for physical and psychological health and well-being; a home that inspires and invigorates, reduces stress and mental fatigue, promotes creativity and positive interactions, and even helps heal. What qualities would this "human-centered" home embody? A growing body of research indicates that instead of being the futuristic caricature often portrayed in science fiction movies, a home designed to promote this level of health and well-being would connect us literally to our ancient preferences for the patterns and rhythms of nature through a variety of biophilic design attributes.

Biophilia is the term used by Pulitzer Prize-winning Harvard biologist and champion of biodiversity Edward O. Wilson to describe "the connections that human beings subconsciously seek with the rest of life." He asserts that human beings have an inherent need to experience nature on an ongoing basis—not just via the occasional "visit" to nature—to ensure optimum physical and psychological health as well as a host of other benefits. Research into the origins and expressions of biophilia reveals that we have an ancient and deeply rooted connection to and need for the natural world, and that the systematic separation and isolation from nature characterized by modern built environments have had profoundly negative affects upon human quality of life and the health of the planet.

Biophilic design attributes are elements and qualities of the physical environment that connect us to the physical, psychological, and cognitive benefits derived from direct experiences with nature. We prefer these natural attributes in part because they literally bring buildings to life physically through the use of design strategies and materials, and symbolically through

Biophilic Design Attributes

- Dynamic natural light (rhythmical living light, patterns of brightness and shadow, sparkle)
- Natural ventilation (movement of air, changes in air temperature, airborne scents)
- Access to open and/or moving water (visual, acoustical, symbolic qualities)
- Frequent opportunities for spontaneous interaction with nature, including other species (integration of and free-flowing movement between interior and exterior spaces, visual and/or physical access to wildlife)
- Sensory connections to nature (physical, visual, material connections between interiors and nature)
- Complexity and order (the relationship of variety and intricacy within an underlying natural pattern of order)
- Mystery (enhances the desire to explore, discover, and learn from the complexities of nature)
- Prospect and refuge (strategic viewing conditions from a position of safety and security)
- Fundamental natural forms (biomimetic models, fractals, natural progressions of scale, rhythm, proportion, repetition, symmetry, gradients)
- Local natural materials (connect the site to the building and interior spaces)

an understanding of deeply rooted affiliations, associations, and meaning.

Why is an understanding of biophilia important to the design of the built environment? Because apparently we can and do suffer from nature deprivation. We now spend 90 percent of our lives indoors. This is a significant shift from how we have lived as a species until very recently. Prior to the last few generations, our home was exclusively, or primarily, the natural world where our physical, psychological, and cognitive development, as well as our survival and well-being, depended upon how well we learned from, interacted with, and coped with the only environment we had: nature. But Edward O. Wilson and other scientists studying biophilia argue that we should not make the mistake of thinking that a few generations of living in the built world is enough time for humans to lose our innate preference for and dependence upon nature for much of what makes us truly human. According to Wilson, it is in fact this essential relationship with nature that is the "source of our humanity."

Recent research indicates that in addition to improved physical and psychological health and well-being, many other benefits are derived from the direct experience of nature, including improved physical skills, improved performance on tasks requiring concentration and memory, increased productivity, restoration from stress and mental fatigue, and aesthetic and spiritual experiences. Studies of hospital patients reveal that those with access to views of nature heal faster and require less use of pain medication than patients without nature views. As evidence of the existence of this strong human need for nature continues to grow, the question we must ask when designing our buildings is: what happens to us when we live—by choice, by necessity, or by force—almost exclusively in artificial environments where intimate interaction with nature is not possible?

Some of the world's best architects, designers, environmental planners, and developers are beginning to ask this question. They recognize that beyond the loss of non-replaceable resources, habitat, and pristine wilderness, we are losing something of ourselves—or as Wilson says, the source of our humanity—in the rush to build.

The lack of opportunity to directly experience nature among a vast portion of people today has been linked to many of our social, personal, and environmental problems. Equally concerning is the suggestion by some biophilia researchers that because we now live almost exclusively in an artificial world set apart from nature, we are facing an extinction of experience through the loss of direct, personal contact with nature. Although this extinction of experience can have profound effects on people of all ages, these effects may be the most damaging for children. When our world is more or less confined to and defined by indoor environments, a broad and diverse aspect of life and learning is simply lost to us.

Wilson explains, "People can grow up with the outward appearance of normality in an environment largely stripped of plants and animals...Yet something vitally important would be missing, not merely the knowledge and pleasure that can be imagined and might have been, but a wide array of experiences that the human brain is peculiarly equipped to receive." He continues to explain that when we are removed or isolated from the natural environment or when the natural environment is degraded or diminished in diversity, there is an increased likelihood that we will experience a deprived and diminished existence as well. And this deprivation can occur materially, physically, cognitively, emotionally, and spiritually.

Clearly it is time for a transformation in design that recognizes the inherent human need for nature together with sustainable design strategies, and universal design as part of a new design paradigm for buildings that step lightly on the earth while touching deeply our bodies, minds, and spirits. This new design paradigm draws from many related concepts, including restorative environmental design developed by social ecologist Stephen Kellert, humanistic sustainability as defined by architect Sandra Mendler, human-centered sustainable design articulated by environmental psychologist Judith Heerwagen, the theory of supportive design developed by behavioral scientist Roger Ulrich, as well as architect Christopher Alexander's pattern language and the nature of order.

The common thread among these concepts is the human-nature connection and the desire to create built environments that are healthy for the planet and for people of all ages. In this new design paradigm, solutions grow from place, human beings are seen as an integral part of nature, and buildings become life enhancing environments.

The Optimum Performance Home™ at The Sea Ranch is an example of this new design paradigm, connecting its occupants to nature and its many benefits through innovative, human-centered design. In addition to the commitment to sustainability as a LEED® for Homes pilot project, and the integration of universal design qualities, the home also includes numerous biophilic design attributes and strong patterns of relationships between the site, the exterior design, and the interior design. These will all be identified, described, and explored in depth in future articles. UHD

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So You Want A LEED® Home...

what's it going to take to get one built?

Ann V. Edminster, M. Arch. &
Jay Hall, Ph.D

synopsis

- The measuring tools (like LEED for Homes) can help you make comparisons with what others have achieved, and can help you set a goal.
- The one universal truth about green building is that the answer to virtually every question is, "It depends."
- Standard advice to those planning a design/construction project of any kind is to work with professionals who have experience that is comparable in nature and scope to their project.
- An integrated design process, however painstaking it may seem, is often in reality the most efficacious path to achieving synergistic solutions.

Part I: Before Construction Begins

The Design Process

You're a dedicated environmentalist and you're about to design and build (or have designed and built) a new home. You're passionate about wanting to do right by Planet Earth with your new home, but you're new to the field of green building. How do you start? You've heard about LEED® for Homes and so you decide you'll use it to guide your design process. Now what?

Before answering that question, indulge us as we take you on a short detour. Imagine that your ambition, instead, is to grow the tallest sunflower in the neighborhood. It's going to be 10-feet tall! You have some seeds, a patch of soil, water, a few gardening tools, and a tape measure…but no gardening experience. What is it you need the most? Will the tape measure help you grow your coveted 10-foot sunflower?

No. What you need most is the wisdom of experienced gardeners, and ideally they should be in your own community or at least share the same climactic conditions. You have a few resources to try. You start with the library and the local bookstore. That helps a bit. You take a gardening class at the local botanical garden. Better. And you talk to other local gardeners. You admire the best gardens in your neighborhood and begin to ask the people who live there about their garden experiences. Eventually you develop the confidence to begin your own gardening experiment. And your learning process continues the more you interact with others and build on their experience with your own.

Building a "green" or high-performance home works the same way. The measuring tools (like LEED for Homes) can help you make comparisons with what others have achieved, and can help you set a goal, but they won't help you grow your dream.

Crafting A Vision

Every exemplary project starts with a vision. To articulate that vision—as is true with most projects—it's often helpful to move from the general to the specific. First describe in general terms what it is you want to accomplish with your new, green home. At this stage, don't sweat the details. What will your deep green home look like? How will it feel? What will it give to you, your family or household, your community, and the planet?

Setting Goals And Priorities

As you go about realizing your vision, you will be faced with many decisions, many trade-offs. The one universal truth about green building is that the answer to virtually every question is, "It depends." There are many things upon which the answers depend, and among the most fundamental are your personal goals and vision. There are myriad opinions about what issues matter the most in the quest for global environmental sustainability, some of them better-informed than others; but there is no one right answer. This means that ultimately, you will have to rely on your own judgment to guide your decisions.

So the next step is to articulate your personal goals and priorities. You will come back to them countless times as you evaluate the pros and cons of various decisions about your home, making dozens of trade-offs.

What matters most to you? Is it deforestation? Global warming? The hole in the ozone layer? Siltation in the local stream? Are you also concerned about the indoor environment? Which of the environmental issues are the MOST important to you? To your community? Assign weights to them.

> "Many celebrated design professionals in the world of green building have identified the common thread in the most outstanding green building projects as having resulted from an integrated design process."

The next step is to set boundaries around your effort. How much are you willing to invest to meet your goals? Consider how much time and money, and research, planning, and coordination effort you are able and willing to put into realizing your dream. How large will your home be? How large or small will its ecological footprint be? Everyone has limits and it helps if you are clear about them—particularly if you are undertaking this process as part of a team of decision-makers.

Assembling A Team

Going back to the assumption that you're new to this business of green building, most likely you'll be working with one or more professionals to help you achieve your green goals. Who should you include on your team? Standard advice to those planning a design/construction project of any kind is to work with professionals who have experience that is comparable in nature and scope to their project. This means your team members should have worked on homes that included similar high-performance goals and that are in the same general size and budget range as yours. Some of the professionals you may want to include on your team are listed and discussed briefly below. Which ones you select, and how many, will be determined by the nature of your needs, goals, and, of course, your budget. In a typical home building project, these experts work invisibly, under the leadership of a project architect or general contractor. In a green project, you need to pay extra attention to be sure that the members of your team are familiar with green home design and building techniques. Ideally, you will find a firm that offers "one-stop shopping" for all of the needed green expertise. As a rule, you will be best off choosing the fewest firms and individuals available that provide the needed qualifications among them.

Architect/designer. The architect is typically the design professional who takes your vision to paper and then to reality. The architect coordinates the work of all the other consultants, holds all the threads, and ensures that all the project needs are being met.

Land planner and/or landscape architect. Depending on the size of your lot, you may want to engage someone accomplished in assessing the opportunities presented by the site—exposure to sun, wind, and rain; relationship to surrounding properties and the community; access to daylight and views; wildlife habitat and corridors; natural water flows; and so forth.

Water experts. There are several types of water expertise, ranging from the relatively conventional to the quite uncommon— experts in interior fixture selection, xeriscape (drought-tolerant/water-conserving landscape) design, irrigation systems, rainwater catchment, and graywater and blackwater system design (including constructed wetlands).

LEED® (Leadership in Energy and Environmental Design) for Homes is a new green building rating system from the U.S. Green Building Council that's being designed to help home buyers identify newly constructed homes that are both environmentally friendly and more affordable to own. A certified LEED Home will offer the following valuable benefits:

- Healthier indoor air;
- At least 30 percent greater energy efficiency;
- At least 30 percent greater water efficiency;
- Improved durability and more environmentally friendly building materials;
- At least 30 percent less storm water run-off ;
- Climate-appropriate landscaping; and
- Higher market value.

Currently in its "pilot" phase, the LEED for Homes rating system is being created through USGBC's consensus processes by a national team of green home-building experts. The pilot program began in August 2005, operating in close to a dozen markets across the United States. The formal launch of LEED for Homes is scheduled for the winter of 2006-7.

Structural engineer. Depending on applicable local and state regulations and the size and structural system of your home, you may need or want a structural engineer. Many architects prefer to work with a structural engineer even if one is not required, because of the engineer's experience in selecting the structural system and design approach that will optimize the effectiveness of use of the materials chosen.

Mechanical engineer. A mechanical (or HVAC) engineer is often needed to advise on the best ways to meet occupant comfort needs (i.e., heating, cooling, and ventilation) and to design, size, and select the mechanical equipment.

Energy specialists. Are you interested in passive solar heating and ventilation, solar electric generation, solar thermal (hot water heating), wind power, geothermal systems? Do you wish to incorporate efficient lighting, heating, or cooling approaches? Depending on your answers and the skills of the people to whom you have access, many of these needs may be met by a mechanical engineer. Other specialized energy professionals may be needed to address the unique needs of your project.

Building scientists. Building science consultants typically look at the interplay among energy performance, indoor air quality, moisture, and other durability concerns, and develop design and construction strategies optimized to simultaneously address all these areas of concern. Some building science firms include experts in energy and mechanical systems, or may subcontract out those services. Specialized building science expertise is most critical for innovative projects and for builders moving into new territory—either literally (new community, new climate zone, etc.) or figuratively (new building materials or methods).

Materials experts. Increasingly, architects (especially "green" designers) are familiar with the burgeoning field of green products and material utilization. Depending on your architect's degree of familiarity with material selection and utilization issues (e.g., resource efficiency), it may be helpful to engage an expert specifically in this area, who may be a consulting architect, specification writer, or other professional. This expertise may also be helpful if you are facing particularly challenging decisions related to structural systems or other materials that have building system-wide implications.

Setting The Team In Motion

There is growing awareness in the green design community that the most effective, or "deepest green," solutions arise when the entire design team collaborates throughout the design process. This dictates bringing on board as much of the needed expertise as you can muster, as early as possible. The effective mobilization of this array of expertise is often referred to as an "integrated design process."

Design integration occurs when the various experts' work is orchestrated in such a way as to produce an optimum result. And "orchestration" is an excellent metaphor for this process because, as it suggests, all contributors play complementary parts in the same piece of music, acting "in sync" to produce a harmonized outcome that is richer and more artful than any lesser combination of parts.

This metaphor necessarily implies someone acting in the role of conductor. Architects are often accustomed to playing this role even in a conventional design project. In a green project, the role assumes additional dimensions, as there are often more players and more disciplines to orchestrate, some of which may be unaccustomed project elements. As always, who may best fulfill this function depends on the background and skills of the architect or other integrated design facilitator. In some instances, it may be desirable to engage a professional whose job is explicitly to act as design integration consultant.

The design integrator's role is to ensure that all contributing professionals are coming together at appropriate phases of the project to ensure that their respective expertise is utilized to the best effect. In a more typical design process, the work of different professionals is done sequentially. In oversimplified

terms, the architect designs the layout and the look of the building, the structural engineer then figures out how to make it stand, the mechanical engineer figures out how to make it comfortable (or tries to), and so on. In an integrated design process, the professionals collaborate to ensure that the expertise of each informs the work of the others. For example, the efficiencies that the structural engineer can suggest may influence the configuration of the building shell… but only if she/he is in an active dialogue with the architect, not if she/he is brought in after all the space configuration decisions are made.

Establishing Objectives

Now that you have decided what you want to achieve and who is going to help you, you'll need to establish some explicit performance targets. For instance, assuming you're concerned about global warming, you'll be interested in minimizing the carbon impacts of your project, which in turn implies setting energy targets. How much energy should your home consume? You may wish to establish targets based on the amount of energy other homes in your area generally consume—or you may wish to set a more ambitious target, such as "net zero energy consumption."

What targets will you try to hit? You may want to consider specific performance targets relative to your community, in relationship to treatment of the land and its other occupants (wildlife), and with respect to consumption and effective utilization of energy, water, and materials. These are the broad areas of impact—and action—frequently used by green building professionals to categorize the strategies they employ.

Integrative Design Decision-Making

Many celebrated design professionals in the world of green building have identified the common thread in the most outstanding green building projects as having resulted from an integrated design process. These exemplary projects invariably exhibit synergies, that is, a chosen strategy, or approach results in multiple benefits throughout the building system; benefits that could not have been realized through a more conventional, "hand-off" style design process.

Solutions arrived at this way are frequently felt by project team members, as well as parties outside the process, to be elegant and highly efficient. They often, in retrospect, appear "obvious," though they do not seem so in the process of creating them. Processes that create solutions that have these characteristics tend to follow some consistent patterns.

1. They involve the evaluation of trade-offs; the trade-offs are ideally made on the basis of the goals and design priorities set early in the design process.

2. The process is iterative and interactive, i.e., a solution is proposed, its implications throughout the system are considered and evaluated, and all relevant parties are engaged in that evaluation process. And then as refinements are suggested, the steps are repeated.

3. The process, at times, may seem slow and laborious.

An integrated design process, however painstaking it may seem, is often in reality the most efficacious path to achieving synergistic solutions. Be patient with the process; don't short-change it. (The process of creating LEED for Homes has been such a process. Throughout the sometimes arduous course of this six-year-long project, we have observed time and again that the fruits of this approach are far superior to solutions generated through more conventional processes.)

A classic—yet relatively simple—example of the need for interactive decision-making involves the integration of mechanical systems into the design of a home. Too often, the mechanical contractor is not engaged in a project until the day that the mechanical equipment is to be installed. The equipment location and duct layouts were not included in the plans. The mechanical contractor has to decide where to install the ducts and the equipment after arriving on the site. The home was completely designed without his/her input. Not infrequently, last-minute compromises in the design and installation ensue, with less than satisfactory results. (Note: someone astute once observed that the definition of a compromise is, "When everybody loses.")

In contrast, if a home is designed to be very thermally efficient, then the mechanical and duct systems can be "right-sized" (i.e., sized smaller due to the improved thermal performance). This is a collaborative process that requires the architect and mechanical contractor to interact at the earliest stages of the project. The result is that the mechanical equipment perfectly matches the home, and the system installed will work more efficiently and provide for a more comfortable indoor environment.

Determining Means—HOW Will You Hit Your Targets?

Moving from your targets to specific means of achieving your desired performance in relation to the community, land/habitat, energy, water, and materials usage entails several steps:

1. Identifying and choosing specific design strategies;
2. Selecting materials and products in support of those strategies; and
3. Resolving conflicts you encounter along the way.

Each performance area you have identified entails the selection of strategies and supporting materials/products for particular project elements. The relationship to the communi-

ty involves the design of site boundary elements as well as the scrutiny of spatial relationships inter- and intra-site, and the design of "negative spaces," i.e., the outdoor spaces created by your new home in relationship to its surroundings. Making the best use of the land resource itself entails close attention to natural elements—wildlife habitat, sunlight, air and water flows—and corresponding care in the design of structures and landscape elements in relationship to one another. The achievement of high performance with respect to energy, water, and materials involves the choice of specific strategies along with supporting equipment, products, and materials.

For example, minimizing demand for potable municipal water will require looking at a range of strategies available for achieving that objective. Some of the strategies may include developing a landscape that needs little or no supplemental irrigation, catching and retaining rainwater for irrigation use, minimizing rainfall runoff from the site through land contouring, designing efficient plumbing fixture layouts, and so forth. It will entail choosing specific plants, water catchment features and equipment, plumbing fixtures, etc. The table below lists some common green home design and construction strategies.

It's inevitable that somewhere along the way, conflicts will arise. You might prefer to use a renewable insulation material —cotton, for example—but learn that it has a lower insulating value per inch of thickness than a non-renewable, petroleum-based material such as rigid polystyrene. In order to achieve the same energy performance, therefore, you would have to have a thicker layer of the cotton insulation in your ceiling, which would in turn necessitate the use of deeper framing members to accommodate it. How do you choose?

These types of conflicts are an unavoidable part of a green design process. Making choices that will work well for you requires looking through a set of lenses ideally developed early in your process. What were the principal environmental goals and values that you identified early on? What is most important to you? What is your tolerance for increased cost and complexity of decision-making? All of these variables influence the decisions you make. Laying that groundwork as early as possible will make the resolution of these issues go much more smoothly (though it won't make the issues disappear!).

COMING SOON …

Part II: Planning For A LEED Home

Understanding the relationship between the LEED rating system and your design

1. The relationship between LEED credits and your:
   a. Targets
   b. Strategies
   c. Stuff

2. What you need to consider at what point in your process:
   a. Early
   b. Mid-stream
   c. Well along
   d. What you can get away with at the last minute… though we don't recommend it

Part III: During Construction

The mechanics of building and verifying a LEED home

Table 1. Basic Green Strategies

Resource Category	Basic Green Design Strategies
Energy Efficiency	High-efficiency thermal envelope High-efficiency heating and cooling equipment High-efficiency water heating equipment High-efficiency lighting and appliances Use of renewable energy sources
Water Efficiency	Rainwater harvesting Graywater systems High-efficiency irrigation systems Low-flow fixtures
Sustainable Use of Land	Sensitive site selection Plant/tree preservation Water-conserving landscaping Surface water management Non-toxic pest control
Sustainable Use of Materials	Appropriate home size Efficient use of structural materials Use of locally produced products Use of durable materials Use of environmentally preferable products Minimizing construction waste
Indoor Environmental Quality	Combustion safety/venting Fresh air ventilation and exhaust systems Supply air filtration and distribution Protection from contaminant (e.g., radon, vehicle emissions)

And What About LEED?

As we alluded to at the beginning of this article, LEED for Homes is a measuring stick. It is designed to assess how effectively you have incorporated high-performance goals into your home. It's not intended to provide you with a road map. That said, everyone we talk to about LEED for Homes wants to know not just how to measure their success, but—not surprisingly—how to ensure their success. They don't want to be met with any unpleasant surprises when their efforts are evaluated at the end of a long, demanding, and emotionally taxing process to which they have committed tremendous personal resources. Hence this article was written to provide guidance that we hope will enhance your success at creating a green, high-performance, and deeply nourishing home.

In Parts II and III of this three-part article (to be published in the Issue 4, July/August and Issue 5, September/October 2006), we will explore, first (in Part II), the relationship between the LEED for Homes Rating System and your project goals and objectives, and then (in Part III), what you'll encounter during construction, as you build and verify the performance of your LEED Home. UHD

The Authors

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Jay Hall, Ph.D., has been consulting with the USGBC on the development of LEED For Homes for the past two years. His background includes 20 years developing voluntary market transformation programs including several of the U.S. EPA's ENERGY STAR® initiatives and Fannie Mae's Emissions Trading Initiative. Since 1995, he has managed the consulting team that developed and supported the EPA's ENERGY STAR For Homes program. He resides in Annapolis, Maryland.

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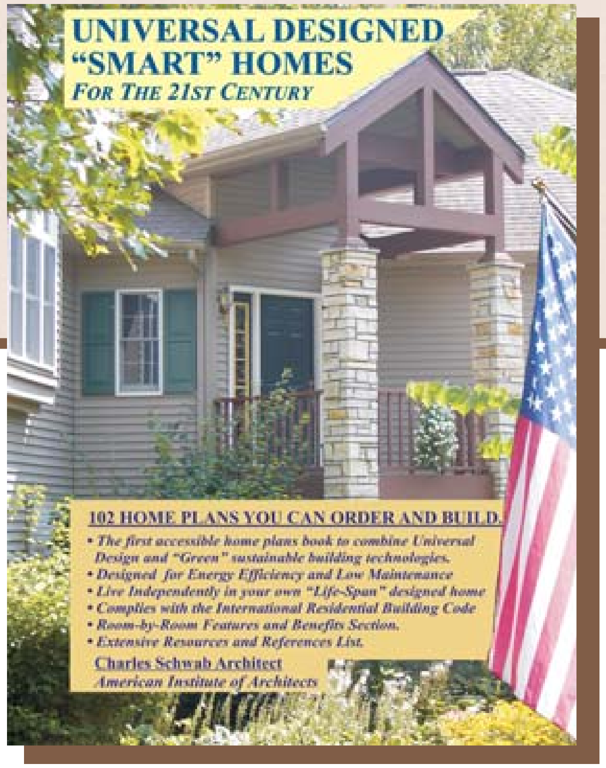
A "Stroll" Through The Universal Designed Smart Home for the 21st century



Charles Schwab, Architect, AIA

synopsis

- Universal Smart Home Design is the process of designing products and housing environments that can be used to the greatest extent possible for people of all ages, all abilities, and physical disabilities.
- The home designs are truly innovative in that, along with traditional universal home design features, they include energy-efficient construction, safety, security, and sustainable "green" building products that provide clean indoor air.
- The new printing of Universal Smart Homes For The 21st Century includes 102 home plans you can order for construction to build your home.

Universal Smart Home Design

Universal Smart Home Design is the process of designing products and housing environments that can be used to the greatest extent possible for people of all ages, all abilities, and physical disabilities.

Universal design (UD) is based on seven principles known as "The Principles of Universal Design." Until now UD has been known as an approach that incorporates an inclusive view towards products and the built environment. The UD Smart Home is inclusive in that it addresses the entire home environment as a whole. In this article, I will not discuss the principles of UD, but rather I will take you on a room-by-room "strolling tour" (both walking and rolling) through the Universal Designed Smart Homes For The 21st Century that I have designed.

During the development of the home plans book, titled above, I had the opportunity to discuss the future UD homes with people with disabilities, physicians, aging baby boomers, and the elderly. Requests included traditional UD, clean indoor air quality, alternate energy sources, and energy efficiency. Many also preferred sustainable "green" building products that had no volatile organic compounds (VOCs) and were formaldehyde-free. Clean indoor air has not, until now, been addressed as a universal design feature. As many of you are aware, respiratory disabilities in the U.S. have the highest rate among those under 18 and the fourth highest among adults. The U.S. Green Building Council also promotes and encourages natural daytime lighting, proper ventilation, lighting control, and clean indoor air.

Several people also requested a safe room: a place of refuge in case of a tornado, hurricane, or man-made disaster. It is not always easy for a person using a wheelchair or anyone with limited mobility to evacuate to a place of refuge in an emergency. It occurred to me that the UD bathroom, which is more spacious than those often built, would double nicely as a safe room.

This became the rationale behind *Universal Designed Smart Homes For The 21st Century*. The home designs are truly innovative in that, along with traditional universal home design features, they include energy-efficient construction, safety, security, and sustainable "green" building products that provide clean indoor air. The homes are also designed to receive an ENERGY STAR® label. This will save you 30 percent annually on your energy bill.

UD Strolling Tour

Upon entering the driveway, you will notice the double-car garage is either 28- or 32-feet wide, thus allowing for a 5- or 8-foot aisle in between cars. This benefits wheelchair users and simplifies car unloading, etc. The non-slip garage floor is a gentle slope of 1/4-inch per foot. All of the garages have a minimum 5-foot diameter level entry area and a maximum 1/2-inch threshold at the 3-foot wide house door. As long as the floor at the garage door is 6 inches lower than the house door, the garage will meet International Residential code requirements.

When we park in the driveway we stroll along a gentle path to the front door, with a maximum 1/20 slope. Landscaping and site grading is designed to avoid "ramps," which have a 1/12 slope and require handrails. The pathway has contrasting brick- or concrete-colored edging for visual definition.

The paths feature a motion-sensor lantern to aid evening visitors. The minimum 5-foot, 6-inch wide entry area is covered at the front porch, reminiscent of historical homes. You will appreciate the covered porch when looking for your keys during inclement weather, pushing a baby stroller, or just enjoying the neighborhood.

The front door is 3-feet wide, has two peepholes at upper and lower heights and a sidelight to easily view guests. Many of the homes have separate exterior doors to home offices. The entry doors have lever handles and a maximum 1/2-inch door threshold. The front porch also has a package shelf and/or a bench. Many provide a through-the-wall, mail/package drop. This allows you to receive your parcels without going outside! The large address numbers beside the door are illuminated at night. The door may have an automatic lock or be connected to a home automation system. The door lock is located at a height that is easily reached by a seated person. Elderly, people using wheelchairs, home movers, and emergency personnel will appreciate the zero-step entry and wide front door.

> "The Universal Design Smart Home is inclusive in that it addresses the entire home environment as a whole."

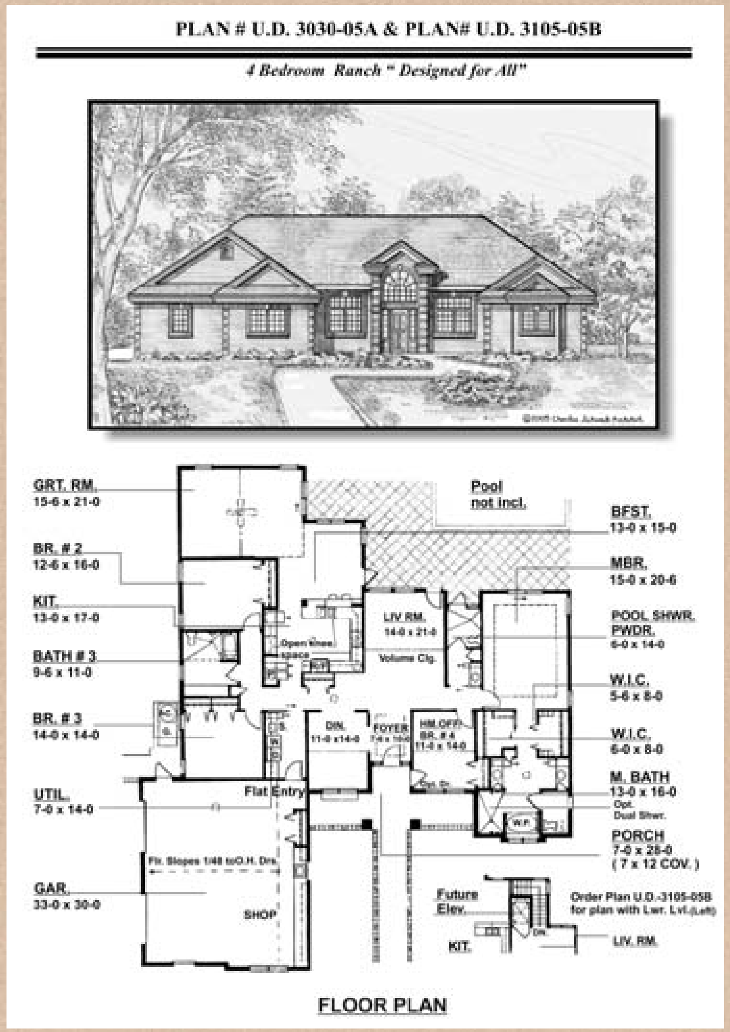
Inside The Universal Designed Home

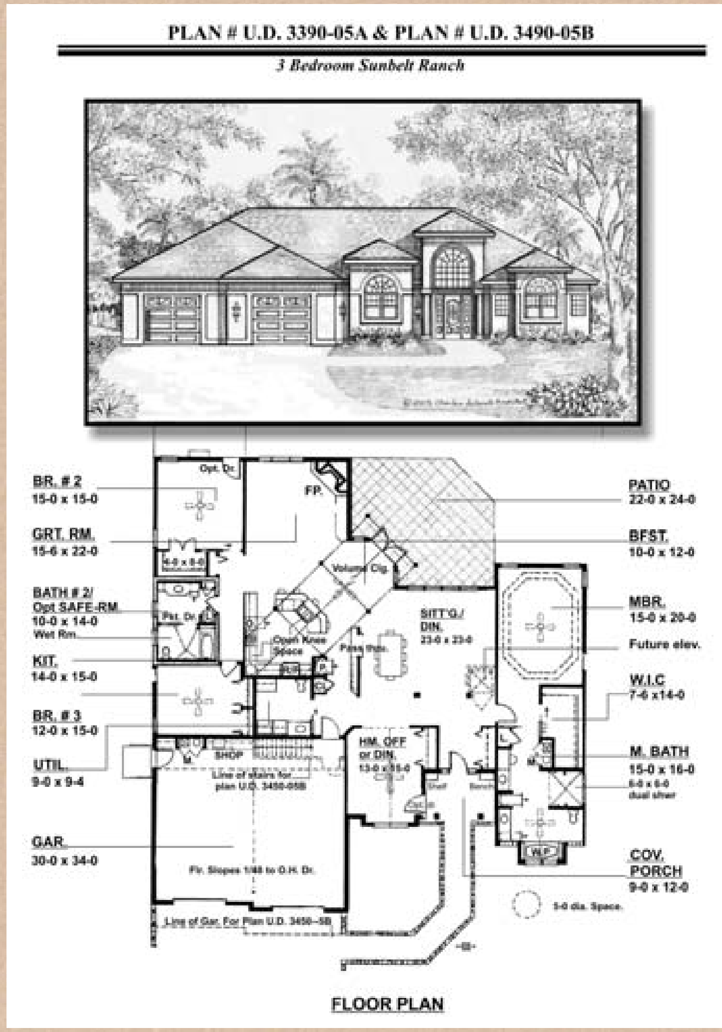
Upon entering the home you may notice a large closet with a 4-foot, 6-inch by 5-foot interior dimension. If the home has an upper or lower level, it is designed with a removable floor. It can be converted to an in-home elevator in the future. I have named this the "Mobility closet/robot room." It includes electrical outlets for recharging mobility devices and storage. It may also serve as a room for "Osimo," your future in-home robot. Many people with circumstantial individual needs already utilize robots in their homes. One day they will be common in the 21st Century home. Nonetheless; the closet provides welcome additional storage.

The entry foyer also has a standard coat closet with height-adjustable coat rods. It is designed with barrier-free door hinges that provide a clear opening, allowing close approach and easy reach. The foyer floor has a hard non-slip, glare-free surface and sustainable floor materials. These flooring types are an option throughout the home. Many of the foyers and hallways are illuminated with solar tubular skylights that provide natural day lighting and conserve energy. They also make the hallway, traditionally a dark space, a safer place and easier to navigate.

There are many consistent UD Smart features throughout the house. The hallways are all a minimum 3-feet, 6-inches

wide and many have a 5-foot turning diameter toward the end. The homes have at least one bedroom and bathroom suite on the first floor. The majority of the home designs are single-story ranch-style. However, the mobility closet and wider stairs allow for a stair lift and make the two-story home accessible. Every room in the home is designed to be fully accessible, including the upper and lower levels. Electrical outlets are 24 to 27 inches above the floor, making them more accessible for everyone. All of the passage doors have a minimum 2-foot, 10-inch clear opening and lever handles. These will assist those with limited hand strength or arthritis. Mechanical controls, such as easy-to-read programmable thermostats and rocker-type light switches are no more than 48 inches above the finished floor. A 1-1/2- to ~~to~~ 2-foot clear space is provided on the pull side of all doors and a minimum 4-foot space is provided inside the room and in front of the door. This makes it easier for a wheelchair user to open the door. This feature is another benefit on moving day. The homes have optional home automation wiring and control systems that can be remote or voice-activated. Automatic door openers are also an option.





Bedrooms

The bedrooms have windows with sills no higher than 36 inches above the floor. The 36-inch high sill allows for clear viewing outside while seated and can aid in emergencies if egress is required. They are often located near a closet with a 5-foot diameter turning space in front. Locating the closet near the window provides daytime lighting near the closet. Closets also have automatic light switches that go on when the door is open and off when closed. They have adjustable rods or universal designed closet systems. Optional sensor switches that turn lights on and off are specified in bedrooms for those who are forgetful. They also conserve energy. Walk-in closets are designed large enough for wheelchair use.

The homes with stairs are well-lit and designed for maximum safety. Stairways have light switches at both the top and bottom. Many have a solar tubular skylight for improved visibility. The treads are a minimum 10-3/4-inches deep (most are 11-inches), and the risers are no more than 7 inches. The treads have a closed riser and a non-slip surface to help avoid tripping. The stairwell is a minimum 3-feet, 6-inches wide and has handrails on both sides. The handrails extend 1 foot past the top riser, and 2 feet past the bottom riser. This is a safety feature that accommodates the inclination to "reach" for the handrail, which may cause a fall.

Bathrooms

The UD Smart Bathroom is a pleasant departure from the bathroom of the 20th century. Upon entering through the 3-foot door with a lever handle, you will notice a minimum 5-foot turnaround space in front of the sink. The floor is a non-slip, glare-free surface or a low-pile, micro-bacterial, waterproof carpet. The faucet is a single-handle, lever type and can be located on the wall side toward the front of the sink. It should not be located further than 21 inches from the front of the counter. This makes it easier for seated people and small children to reach. Tank-less, point-of-use water heaters conserve energy as they heat the water immediately before it is needed. Combined with a foot-operated "Water Pedal" product, an automatic faucet sensor, and/or faucet aerators, you will conserve both energy and water. These are innovative "green" features of the universal designed smart bathroom.

At least one sink is not higher than 32 inches above the floor and has open knee space underneath. Cabinet door hardware with open D-shaped pulls and slide-away hardware allow the cabinet doors to open and slide back into the cabinet. This feature allows the vanity to have an open knee space and look the same as others when the doors are closed. Vanities with front-of-unit switches that allow height adjustment from 28 to 38 inches are also available. This may be desirable when only one sink is available. The hot water pipes have scald-protection covers that protect legs from burns. The sink bowl is a maximum 7-1/2-inches deep and can have an elongated bowl that extends past the counter front for greater accessibility.

Vanity lighting is side-mounted, thus eliminating face shadows from overhead lighting. Full-height cabinet drawers with full-extension hardware make it easy to view and retrieve the contents within the most accessible heights, 22 to 48 inches above the floor. Electric, fog-free mirrors and mirrors located directly above the back-splash enhance viewing for a seated user. Mirrors can also be slightly tilted at the top, helping view the sink contents while seated. Bathrooms also have a full-length mirror for grooming and dressing. A wall-hung hair dryer is a handy appliance. All of the outlets within 6 feet of a water source have GFCI water protection. A wall side-swinging mirror is also useful for close grooming. Many of the UD Smart Bathrooms are specified with the solar tubular skylights with built-in fans for natural daylight and ventilation.

The toilet is centered 18 inches from a sidewall. Wood blocking or marine-grade plywood is installed beside and in back of the toilet for future grab bar placement, allowing anyone to use the facilities. Many designs have enough space on the other side for a wheelchair or caretaker. Toilet height is often a personal choice. Wheelchair users prefer a toilet height as close to that of their wheelchair height, while those with weak leg strength or the elderly may prefer a 17- to 19-inch or higher seat height. I design at least two different heights within the home. The use of automatic toilet lifts also provides varying heights that accommodate everyone.

Every home has at least one curbless shower, and most have options for a "wet-room" area where the toilet and the shower are adjacent to each other with a weighted shower curtain sliding in front of both. A flexible/collapsible water dam keeps the water in the wet area. Height-adjustable, hand-held shower units with 7-foot hoses slide on a vertical grab bar. I specify a product that allows you to control the water flow from the hand-held unit. Wall controls are installed toward the front of the shower in both prefab and custom shower applications. The pressure-balanced shower control provides scald-free protection. Grab bars are included in prefabricated units or marine-grade plywood backing is installed behind tile. This allows grab bar placement at any location. The shower has a vapor-proof light/fan unit above. For those who also prefer a tub, automatic tub lifts are available to lower you after you have made a side chair slide transfer. Ceiling transfer lifts are also an option for people with these needs. Phones are included in bathrooms and may be connected to an emergency alert system.

Kitchens

Everyone will be able to participate in the UD Smart Kitchen. The sink is located between the refrigerator and the stove. This allows a person with limited strength to slide items between all three without having to pick them up. The appliances are ENERGY STAR rated and are not closer than 4 feet nor further than 9 feet from each other, as measured from the center of the unit. In the kitchen work triangle, the distance between all three added together, does not exceed 26 feet. The kitchen space is designed so that it functions well for left- and right-handed people. Appliances are usable from the left, right, and front approach. A minimum 30-inch x 48-inch space in front of each appliance is provided. Most kitchen designs have a 5-foot diameter space in front of each appliance. I strive to provide 12 to 18 inches (or more) counter space on each side of the main appliances. This is often difficult in the smaller homes. The majority of the kitchens are designed so that two people may work together at the same time without being in each other's way. Pathways of 48 inches provide ample room for everyone.

Varying counter heights make the kitchen usable by everyone. The counters have a rounded or beveled edge for safety and contrasting color for visual definition. This makes it easier for those with limited vision to see the edge of the counter. One sink is 32 inches above the floor and adjustable, with open knee space below. It has a roll-out bin underneath for added storage and uses the same slide-away cabinet door hardware as in the bathroom. The garbage disposal is offset to the left of the knee space, allowing more clear space underneath. The dishwasher is adjacent to the sink and can be raised so that the counter is 42 inches above the floor. This makes it easier to load and unload the dishwasher without excessive bending and provides another higher work-space for standing users. The higher counter does, however, become an obstacle if sliding objects along the countertop is necessary. This feature is your personal choice.

For the cooktop, I recommend a level ceramic-top surface with cool-to-the-touch, inductive burners with down-draft ventilation. All burners have staggered offset burners with easy-to-use front-of-unit controls. This allows one to reach the back burners without reaching directly over heated elements. It is preferable to have another knee space opposite one side of the cooktop with the microwave located above. The microwave should be on the counter or 3 inches lower than the cabinets within easy reach. Raised side-swing ovens are best located adjacent to this knee space and have a pull-out shelf underneath. Everyone will be able to reach all three cooking appliances from one location, without having to bend over to use the oven.

The refrigerator is located on the other side of the sink with generous counter space in between. It is the side-by-side refrigerator/freezer type that allows access to both at every height. It also has an in-door ice and water dispenser.

The lower cabinets have lazy Susan, pop-up shelves and full-extension drawer hardware. The upper cabinets are lowered 3 inches below the old 18-inch standard. This will greatly increase upper cabinet accessibility for everyone and still allow a 15-inch vertical space for other appliances. Low-voltage task lighting is located in front and under the upper cabinets. This is also a good location for additional outlets. Lower front-of-cabinet outlets are helpful for seated users, but they can be dangerous for small children. Since portions of the counter and the upper cabinets are lowered, they will be accessible and out of reach for small children.

UD Smart Kitchens offer more features such as islands, variable height breakfast bars, accessible pantries, and recycle and work areas. Natural daytime lighting and windows with front crank-out windows are also accessible features.

Summing Up

I hope this "stroll" through the Universal Designed Smart Home For the 21st Century has been helpful to you.

The new printing of *Universal Smart Homes For The 21st Century* is updated and includes 102 home plans you can order for construction to build your home. There is also 22 pages of room-by-room features and benefits that expand on those noted above .The principles of universal design and green building practices are described in depth, and there is a 22-page resources and references section. The cost of the book is $24.95 plus $5.00 shipping and handling. The book is available for ordering through *Ultimate Home Design*'s Web site at www.UltimateHomeDesign.com or by phone at 951 676 4914 or toll-free at 888 977 7827. UHD

The Author

Charles M. Schwab is a member of the American Institute of Architects (AIA) and a graduate from the College of Architecture at the University of Colorado. He also studied architecture, in the German language, at the University of Regensburg in Germany. Mr. Schwab was an architect in training in Aspen when his first project as architect project manager was an environmental center with passive solar heating and hot water heating and other green features in the heart of Aspen. Upon return to the midwest while starting his own practice he was also a caregiver for his grandfather who had suffered a series of strokes. It was then that Mr. Schwab realized that the standard American home does not meet the needs of an aging population or most anybody with a disability. Combining universal design and green sustainable features became the rational of *Universal Designed Smart Homes For The 21st Century*. The book was first written and published by Mr. Schwab in 2003. The 102 homes are also designed by Charles Schwab, AIA. It is North America's first stock home plans book that combines green building features and universal design.

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The Better Home, Better Planet Initiative:
near-zero energy home

George MacLeod

synopsis

- *The home demonstrates building materials and designs that are energy-efficient, accessible, affordable, faster to construct, resistant to natural disaster, and compliant with sustainable building practices.*
- *The 2,900-square foot, three-story residence is built in the prairie style of architecture a la Frank Lloyd Wright.*
- *The home was built in accordance to durability standards developed by the Institute for Business and Home Safety (IBHS), a non-profit corporation funded by the insurance industry to reduce property loss.*
- *Incorporating many aspects of universal design, from stylish fiberglass shower enclosures to high-tech appliances, BASF's "Better Home, Better Planet" showcase home adds important ergonomic and safety benefits as well as the potential for increased property values.*

A Different Building Strategy

From Sri Lanka to St. Louis, the need for affordable, energy-efficient, disaster-resistant housing has become acute. In Louisiana alone, the Red Cross estimated at least 416,894 housing units were destroyed by Hurricane Katrina. The initial $80 billion appropriated to meet this challenge was largely consumed by emergency relief, debris removal, and temporary housing strategies, including $3.6 billion for mobile homes and trailers. That's $3.6 billion worth of housing that will consume inordinate amounts of energy until it's swept away by the next big storm.

Clearly, we need a different strategy, and Gary DeSantis, Senior Corporate Architect for BASF, believes he has one. In 2005, BASF spearheaded construction of the Better Home, Better Planet Initiative: Near-Zero Energy Home, in Paterson, New Jersey The home, opening April 26, 2006, demonstrates building materials and designs that are energy efficient, accessible, affordable, faster to construct, resistant to natural disaster, and compliant with sustainable building practices.

BASF's slogan, "We don't make the products you buy. We make the products you buy better," explains why the company was uniquely qualified for the job. BASF's chemical-based products are ingredients in dozens of building materials. The key ingredient, however, was probably DeSantis himself. As an architect with 34 years of experience and a passion "to do the right thing," he was clearly the right man, at the right place, at the right time.

In all, he coordinated in-kind support of time and materials from more than 50 BASF customers and created audiences in markets from Paterson, New Jersey, where the demonstration home is being looked at as a model for the city's unit infill housing projects, to Mississippi, where Governor Haley Barbour recently met with BASF to consider using the same technologies to replace hurricane-damaged homes. Following the eye of the storm, so to speak, and enabled by BASF's global reach, DeSantis and the BASF team is using the Near-Zero Energy Home in Paterson to open markets in China, Sri Lanka, and India.

In addition to being 80 percent more energy efficient than a traditional stick-framed home, the Paterson project is a prototype for the newly launched U.S. Green Building Council Leadership in Energy and Environmental Design for Homes (LEED® for Homes) rating system, a voluntary initiative promoting the transformation of the mainstream home building industry toward more sustainable practices. According to Jay Hall at the U.S. Green Building Council, there are more than 300 other players in that field, many of them builders or developers simply testing the waters to determine whether LEED for Homes certification is worth the effort. "There may be a handful of these pilot houses looking for the gold rating," said Hall. "It's very difficult to achieve." DeSantis and the BASF team are targeting the higher level of platinum.

The 2,900-square foot, three-story residence is built in the prairie style of architecture a la Frank Lloyd Wright. What's truly unique, however, is the building envelope. BASF makes Styropor® expandable polystyrene (EPS) resins—the material used to produce "popcorn" packing foams. In addition to its exceptional insulating qualities, EPS is recyclable and fire-resistant, bugs and pests avoid it, and the houses built with EPS are more resistant to damage from high winds.

The basement and first floor of the house are built using insulating concrete forms (ICFs) from American Polysteel®. Each unit has an inner and outer EPS foam panel connected by steel ties. They are stacked to form a wall, and then filled with concrete, creating a seamless wall structure with an insulating factor between R-30 and R-50. The second floor and roof of the home are built with structural insulating panels (SIPs) made by Insulspan®. These pre-fab panels consist of an EPS foam core sandwiched between layers of oriented strand board (OSB).

ZERODRAFT® polyurethane foam sealants, again containing BASF chemicals, join the building envelope together, creating a thermal envelope around the structure that substantially reduces air infiltration, compared with conventional construction techniques.

"Overall, getting the envelope right is most of the battle," DeSantis said. "Once you do that, other technologies, like solar, become cost-efficient. It's the platform you build to support the rest. From there you can create unlimited synergies."

> "In addition to being 80 percent more energy efficient than a traditional stick-framed home, the Paterson project is a prototype for the newly launched U.S. Green Building Council Leadership in Energy and Environmental Design for Homes (LEED® for Homes) rating system."

Solar Energy And The Well-Built Envelope: A Near-Zero Match

The two solar energy systems integrated into the roof are a good example of these possible synergies. 2.5kW of electricity are generated by Ovonic Solar® voltaic sheets, which are laminated over the Englert® metal roof panels. Under those panels, a Dawn Solar® Model 3004L thermal collector system, a laminated mat of cross-linked polyethylene tubing, collects heat when the sun shines for heat and domestic hot water. The thermal heat carried off by the glycol cools the roof and improves the efficiency of the photovoltaic collector.

According to Bill Poleatewich of Dawn Solar Systems, these collectors "work synergistically with the 'Cool Roof' coatings provided by BASF and PV laminates by converting the roof assembly from a passively cooled system to an actively cooled system. Solar energy in the form of heat that is detrimental to the building's performance is harvested…and transferred to the building's domestic hot water system. The resulting high-performance building envelope characterizes building systems of the future using recyclable materials and interoperability of systems in which what is waste for one system is converted to fuel for another system."

A Home For All:
incorporating universal design

George MacLeod

The Better Home, Better Planet Initiative: Near-Zero Energy Home, Paterson, New Jersey, meets or exceeds fundamental expectations regarding barrier-free design, ergometric, state-of-the-art appliances, and accessible bathroom and kitchen accommodations. There's also an elevator and a ceiling-mounted hoist to carry the quadriplegic boy between bedroom and bath. But, here, again, the EPS-system building envelope provides a platform for new synergies.

If the essence of universal design is to assure access and control, then the controlled environment afforded by seamless, insulated construction would seem essential. In the case of the Near-Zero Energy Home, it allowed Steve Winter Associates to design an HVAC system that will provide optimum comfort and efficiency with simple, intuitive controls. The heart of the system is a Viessmann® high-efficiency condensing boiler connected to a REHAU® radiant floor heating system. A two-stage, variable-speed Amana® air conditioning system improves air quality by supplying clean, fresh air while monitoring indoor temperature and humidity levels. Control of this state-of-the-art technology is accessible with touch-screen programming on a Siemens® automated home control system.

The result? The Better Home, Better Planet: Near-Zero Energy Home, Paterson, New Jersey, is expected to receive an ENERGY STAR® Home Energy Rating Score (HERS) of 93, the highest score in New Jersey ENERGY STAR history.

Give Us Shelter From The Storm…A Home's First Duty

Although it doesn't look like it, the Better Home, Better Planet Initiative: Near-Zero Energy Home, Paterson, New Jersey, is built like a bunker.

The home was built in accordance to durability standards developed by the Institute for Business and Home Safety (IBHS), a non-profit corporation funded by the insurance industry to reduce property loss. The IBHS's flagship program "Fortified…for safer living®" was rolled out about six years ago in response to Hurricane Andrew in 1992. The program's standards vary according to the specific natural perils in each region of the country. In New Jersey, the highest natural risks are high winds and severe winter weather.

REHAU® Radiant Floor Heating System Installation

Basement and first floor constructed with insulating concrete forms (ICFs) from American Polysteel®

BASF Styropor® Expandable Polystyrene (EPS) exterior building envelope built with Insulspan® pre-fab panels

According to Insulspan president, Frank Baker, although typical stick-frame homes can be built to these specifications, getting there may be easier with SIPs. "They are proven to be much stronger than stick-frame walls because of their rigidity," says Baker. "With SIPs, it's much easier to design for high winds. The strength is inherent; it's built in. It's not something that is added afterward with additional details."

Capping the home is an Englert metal roof, which is anchored with fasteners designed to withstand extreme forces.

Unlike other roofing systems, metal roofing panels can be locked together to form a single unit with the fasteners engineered to withstand whatever force is necessary.

"One of the main things about metal, you can engineer the attachments to whatever conditions you expect," explained Tom Black, Executive Director of the Metal Roofing Alliance. "A metal roof can last 50 to 60 years, or two or three times longer than asphalt shingles," he said.

Hall said that the vast majority of the 300 pilot homes that have applied for LEED certification have conventional wood frames rather than the more durable EPS systems used in the Paterson home. This seems an anomaly, given the wind and weather-related losses our national housing stock has endured in recent years.

Pat Murphy, President of American Polysteel, agrees, but says the tide is turning. "Gulf area homes built with ICFs had virtually no storm-related structural damage and limited ancillary damage," said Murphy, which probably explains why he and DeSantis were invited to talk housing reconstruction with Governor Barbour. "We estimate last year ICFs were used in about five percent of new construction nationwide. Right now we're seeing a dramatic increase in that demand in the Gulf Coast area right over to Florida."

The markets in Europe and Asia look even better. According to Murphy, concrete replaced lumber in those countries long ago. "Right now, we're working with BASF on post-tsunami replacement housing projects in Sri Lanka and India." The "Three Liter House," another EPS demonstration home, was recently built in Germany. Environmental futurist William McDonough plans to use the technology to help the China Housing Industry Association build seven new cities housing 400 million people in the next 12 years.

After completion, the Paterson house will be open to builders, developers, architects, and realtors as an educational center to demonstrate these new building technologies. The home will then be donated to a local charity, St. Michaels' Housing Authority, so that a quadriplegic boy and his family can finally live in a "universal design" home that answers their unique challenges.

In a world that is increasingly connected, this home in a mid-sized, urban, North American community is emerging, and a shining example of how to combine readily available technologies that are rapidly emerging as solutions for the global need to make the most of our limited resources, and protect the lives and property of citizens in every corner of the planet. UHD

The Author

George MacLeod is a freelance writer who lives in East Orland, Maine.

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Universal Design Bath And Showers Showcased In
BASF "Better Planet" Home

Ed Sullivan

Incorporating many aspects of universal design, from stylish fiberglass shower enclosures to high-tech appliances, BASF's "Better Home, Better Planet" showcase home adds important ergonomic and safety benefits as well as the potential for increased property values.

New worlds are converging in Paterson, New Jersey. The often challenging building principles of universal design, eco-friendly construction, energy efficiency, and home automation are coalescing in an unprecedented manner at a new BASF-sponsored prototype residence in Paterson.

Known as the Better Home, Better Planet Initiative: Near-Zero Energy Home, the three-story, 2,900-square foot dwelling will initially serve as a design "clinic" for homeowners, builders, architects, and government officials. The home is later destined for a local charity, St. Michael's Church, which plans to house a local quadriplegic teenage boy and his family.

The many access and safety benefits of universal design, increasingly desired by physically-impaired and senior occupants everywhere, have been enhanced to meet the special needs of the quadriplegic boy (disabled in a car accident), enabling his family to provide everyday care.

A special hoist has been installed in the boy's bedroom and runs on a ceiling-mounted track to an adjoining bathroom that is outfitted with a track- and wheelchair-accessible shower. An elevator, accessible kitchen accommodations, extra-wide hallways, and other universal design features provide access, comfort, and inclusiveness to the disabled boy and his family throughout the dwelling. Overall comfort is ensured by superbly energy-efficient heating and cooling, ergonomically-enhanced amenities, and "Smart Building" controls.

Universal design, the art of planning homes to be inclusive of everyone, regardless of age, ability, or physical stature, is the wave of the future and architects, physical therapists, and others involved with the needs of the disabled and the growing senior population. Several of the dozens of premier supplier partners to BASF in the Paterson project are committed to setting the high standard for such inclusiveness, including accessibility.

Meeting A Mixture Of Requirements

"The BASF Better Home, Better Planet Paterson home is an energy-efficient, environmentally-friendly home that demonstrates basic principles of universal design," says project champion Gary DeSantis, Senior Architect for BASF, The Chemical Company.

"We are building this home for a quadriplegic teenage boy, so we've included specific elements for him that may not be necessarily for, let's say, senior housing," DeSantis explains. "But in addition to these special amenities, the house intends to give practical universal design options that can and should be incorporated in any home. With an increasingly aging population, including some practical universal design, more people can live in their homes longer."

The features and benefits of universal design depend on the application and technologies involved. In the shower, the need may be for wheelchair access, which requires removal of the traditional entry curb. But safety should also be a major consideration; if an occupant falls, serious injury can occur. If the occupant is a senior or disabled person, the consequences could be life-changing.

"One of the areas where this certainly applies is in a home's bath and shower facilities," says Jeff Mooney, Director of Marketing for Best Bath Systems, whose fiberglass shower enclosures were used in the project. "Our increased awareness of the growing population of people who are elderly, frail, or infirm has expanded our awareness of the need for showers that are safer, more comfortable, and more accessible."

In the kitchen and laundry areas of the home, which include the latest appliances from Whirlpool Corporation, universal design was also an important consideration. Mark Johnson, FAIA, Manager of Architectural and Design Marketing at Whirlpool Corporation, says this reflects principles that his company has been applying to many of its home appliances beginning in the early 1980s.

"We began by offering special covers for appliance knobs, making them easier to grasp, Braille overlays for controls, large-print instruction manuals, and audiotapes were provided for users who were visually-impaired," Johnson says.

"Our thrust is in three basic areas," he explains. "The first is ergonomic, especially concerning height, reach, and all of those things that make an appliance physically more accessible. Secondly, we try to maximize visual comfort. As we all get older, reading small print is a challenge, so we've made sure that visual cues are easier to view. Thirdly, we consider users'

cognitive requirements. Older people, for example, tend to slow down a bit and take their time to process information, either in learning about an appliance or in actually operating it."

Incorporating Universal Design Into Bathing

Providing access, comfort, and safety is the whole idea behind the fiberglass shower enclosures made by Best Bath Systems, which are included in three areas of the Better Home, Better Planet Paterson home.

The shower adjacent to the disabled boy's room is a special two-wall design that allows the track of the special overhead hoist to pass through the enclosure if desired. Alternate wheelchair entry is facilitated by a neoprene "water dam," a popular Best Bath feature that eliminates the need for a cumbersome curb to keep water from flowing onto the bathroom floor. The water dam consists of a gasket that collapses as a person or wheelchair passes over it then reshapes to prevent the water-flow problem.

"In many cases, we provide an adjustable shower head or hand-held shower wand in order to make bathing areas more accessible," Mooney explains. "They enable maximum flexibility for use with the disabled or seniors, but children and adults also love them." Mooney says benches or stools can be a great aid for infirm or fragile people and their caregivers.

Another important universal design feature of shower enclosures is suitable safety rails, or "grab bars." A wide variety of safety bar styles are available, and in many cases these should be installed to meet the physical requirements of the disabled or elderly user. Best Bath shower enclosures are constructed with extra-heavy plywood backing to facilitate the installation of safety rails and hand grips, and also to enable the relocation of such hardware in a very secure manner without causing leaks

Helping Out In The Kitchen

One of the other rooms of the house that can benefit most from universal design is the kitchen, and the BASF Paterson project kitchen includes Whirlpool brand appliances with many universal design features.

The new Whirlpool Gold® side-by-side refrigerator with formed door includes several thoughtful features that may be especially useful to seniors and the disabled, but are designed to be beneficial to all. In the door is the Whirlpool Gold® Fast Fill Dispensing

For more information on this advertiser, check 16

System, which offers a pullout shelf that allows people to rest containers, including pots, while they are being filled.

"This can be extremely helpful to people who have difficulty holding a steady hand while filling a glass, or who are uncomfortable with the weight of filling a larger container," says Johnson. "An aerated water spout fills twice as fast while reducing splashing, and is activated with a touch sensor rather than the usual push paddle. There is also a simple water measurement control that allows you to extract the exact amount of water desired in ounces, cups, or liters."

The Paterson Project kitchen also includes the new Whirlpool Velos™ SpeedCook Oven, which is a combination of quartz, halogen light, and g2 SpeedCook technology that provides the ability to grill, brown, and even bake in a fraction of the time. Additionally, a heating coil provides the option of convection cooking. "While the Velos provides the conveniences of a traditional microwave, an added technology allows people to steam, melt, and defrost easier and with more perfection," says Johnson. "Also, the controls run across the bottom of the appliance door, making it easier to reach and easier to read the controls."

Additionally, Whirlpool Corporation has donated a Whirlpool brand Duet® Washer & Dryer pair, which are pedestal-mounted to alleviate bending and stretching and feature front-mounted controls for easier reach and setting. In keeping with the "green" requirements of the Paterson home, the ENERGY STAR®-qualified washer allows homeowners to save 69 percent of water and 61 percent of energy, compared to average traditional top-loading washers.

"Accessible" Can Also Be Beautiful

One of the setbacks in designing houses with accessibility features has been the likelihood of an unwanted "institutional" look. Going beyond mere accessibility requirements, universal design should look good and be aesthetically appealing to people in general. If done correctly, universal design features should add value to residential real estate.

"My mission was to ensure not only accessibility needed by the boy, but also that the home is cheerful and does not have that institutional look that is common with facilities that have traditional handicapped access," says Pat Gaylor, interior designer for the Paterson home. "With this project we've incorporated the functionality of the handicapped access along with the new style and standards of universal design."

Gaylor's thrust was to make this home a pleasant, family surrounding. Part of this thrust is in the bathrooms, where she used color schemes that would be appropriate for the boy, his parents, and also guests.

"I'm doing a lot of designing for people who are middle-aged and planning to age-in-place during their senior years," she explains. "They often want their master bedroom on the first floor. They don't want to have to walk up the stairs. They might want the safety and convenience of a three-sided shower with a water dam and all of these great accessories, ranging from very nice safety hardware to benches and stools. They often want lots of exotic controls, shower heads, and water wands, and so on.

For those situations, Gaylor favors the fiberglass shower units that were contributed by Best Bath Systems. "They are attractive, easy to keep clean, and are available in a wide range of colors, enabling you to create designer tile effects," says Gaylor. "I used burgundy tile in the boy's room to give it a youthful feel. And then one is sage green in one room and hunter green in another with biscuit-colored fixtures, including the toilet and sinks. So these colors go with any type of ceramic tile you want to put on the floor or anything you want to do for accents. And they do not look institutional at all; they are beautiful units."

A Comprehensive, Creative Project

BASF undertook the Better Home, Better Planet Initiative: Near-Zero Energy Home project aligning with some of the world's most creative thinkers and planners, by forming strategic partnerships with the U.S. Department of Housing and Urban Development, The U.S. Department of Energy, and manufacturers of innovative eco-friendly products, and by taking a leadership role in designing and building demonstration homes that inform and educate about smart building practices.

The new technologies and envelope upgrades are used throughout to improve the home's energy performance. The combined use of advanced HVAC, solar hot water, mechanical ventilation, and photovoltaic systems make the house one of the most energy-efficient dwellings in the state of New Jersey. As well, the home has been selected to participate in the new U.S. Green Building Council's Leadership in Energy and Environmental (LEED®) for Homes Pilot Program, the most stringent green building certification program in the country.

"This project is a vision I've had for quite a while," DeSantis says. Built as a template for the city's aggressive 3,000-unit urban renewal project, BASF brought together more than 50 companies and organizations, which made significant contributions to the project. "The best part is, all of the technologies used in the Paterson demonstration home are available to homeowners right now." UHD

The Author

Ed Sullivan is a writer on the subjects of healthcare, construction, and technology. He is based in Hermosa Beach, California.

Note: A complete listing of BASF Better Home, Better Planet: Near-Zero Energy Home strategic allies and notable products and services, which contributed to the success of this home can be found at www.UltimateHomeDesign.com/

National Mainstream GreenHome Project

Jonathan Millman

synopsis

- The GreenHome is designed to meet green building standards, while looking and functioning like a traditional home.
- Environmental factors are being taken into account in every aspect of the home, and the home will utilize a range of technological innovations, minimizing impact on the environment without sacrificing comfort.
- To better utilize renewable energy resources, the Mainstream GreenHome will feature a ground-source heat pump, i.e., one form of geothermal energy.
- The GreenHome is eco-friendly inside and out.

National Green Building Conference

In March, at the National Association of Home Builders' (NAHB) Green Building Conference, Cherokee Investment Partners announced plans for its Mainstream GreenHome—one of the first of its kind known to be built in a traditional infill neighborhood.

The GreenHome is designed to meet green building standards, while looking and functioning like a traditional home. As a global leader in brownfield redevelopment, it is Cherokee's hope that the lessons learned from this project will catalyze the transformation of home building nationwide and encourage greener standards throughout the building community. Built as a demonstration home, it is intended to persuade conventional builders of America's homes—those responsible for the majority of homes built in America—to embrace green building both individually for their own projects and collectively through their various home builder associations.

The environmentally friendly home, expected to be completed in the fall of 2006, is being built near Cherokee's headquarters in Raleigh, North Carolina, and will showcase a mix of techniques, systems, and products that may make sense for either individual construction or large-scale development (and in some cases, both).

The GreenHome project will showcase residential green building as a viable and even preferable means of construction for typical home builders, while providing features that don't sacrifice livability for residents. Cherokee's design and construction of this home makes it the first known example in the nation to be built in a typical subdivision under the NAHB Model Green Home Building Guidelines and one of three green homes in the nation to be built under such guidelines. The other two homes are non-subdivision homes located in State College, Pennsylvania; and Albuquerque, New Mexico.

"We have an opportunity to influence large-scale development and vertical construction. Starting with the tens of thousands of homes that will be built on the sites we currently own, we have launched a green initiative, and are kicking it off with the Mainstream GreenHome. This seems like something we should have been doing years ago. We need to innovate ways to integrate more sustainability features into the horizontal and vertical construction of our sites," said Tom Darden, CEO of Cherokee.

Environmental factors are being taken into account in every aspect of the home, and the home will utilize

> "The GreenHome project will showcase residential green building as a viable and even preferable means of construction for typical home builders, while providing features that don't sacrifice livability for residents."

a range of technological innovations, minimizing impact on the environment without sacrificing comfort. As a result, the GreenHome aims to:

- Use 50 percent less fossil fuel than the conventional home
- Recycle or reuse 90 percent of all organic waste on site
- Consume 50 percent less water than the conventional home
- Recycle 75 percent of all construction and demolition waste
- Retain 95 percent of all storm water on site for reuse or infiltration
- Provide exceptional indoor air quality with 95 percent of all products having low or zero volatile organic compounds

To better utilize renewable energy resources, the Mainstream GreenHome will feature a ground-source heat pump, i.e., one form of geothermal energy. This system will utilize the constant temperature of the Earth's subsurface temperatures to heat and cool more efficiently (perhaps a 30 to 40 percent reduction in energy use for space conditioning), while significantly reducing HVAC noise and space requirements for outdoor equipment. Solar photovoltaic technology will generate electricity to meet a portion of the home's needs and then feed any excess generation back to the grid during peak hours. Solar thermal technology will provide a source of heat to meet the majority of the home's hot water needs. Both solar systems will be undetectable from the street elevation to ensure the aesthetic integrity of the traditional Williamsburg-Colonial style exterior aesthetic. As a final renewable energy strategy, the GreenHome is expected to use renewable energy credits (REC) to offset its remaining energy use with clean energy such as that generated by wind, solar, or landfill methane.

To further minimize heating and cooling loads, the attic and crawlspace will be non-vented, yet insulated and indirectly conditioned, to actually boost energy performance while improving the overall air quality of the home. Further energy reductions will come from the use of ENERGY STAR® appliances, efficient and environmentally friendly, spray-foam insulation, and carefully selected glazing inside the specially insulated window openings that maximizes daylight while promoting thermal efficiency.

In addition to energy conservation, the GreenHome is designed to conserve another critical resource—water. The GreenHome is expected to meet or exceed its target of reducing its use of potable water by 50 percent. Low-flow toilets and other water-conserving plumbing fixtures will ensure that water is not wasted in the kitchen and bathrooms. An innovative rainwater collection system will collect rainwater from the roof, filter and store it in an underground tank, and provide water as needed to the washing machine, toilets, and for outdoor irrigation. It is believed that this will be the first time such a system has been permitted in the municipality. Crates located under the driveway will effectively manage storm water by capturing runoff, storing it, and affording the water opportunity to naturally absorb back into the ground.

Careful consideration also ensures that the GreenHome is eco-friendly inside and out. Attention to the yard is an important aspect of greening conventional home building. All trees not located within 10 to 15 feet of the home's foundation were preserved and fenced off at their drip lines during construction. Native vegetation and attention to xeriscaping principles will help reduce outdoor water needs and ensure plant viability. A mixture of mulched areas with attractive, low-maintenance plantings will be combined with typical turf areas to increase biodiversity and lower water requirements. An integrated pest management plan will significantly reduce the need for pesticide use in the yard, and habitats for natural pest predators will be erected on site to minimize problems with mosquitoes. Recycled organic waste from kitchen and yard uses will be used to fertilize plants instead of chemical fertilizers, which are more prone to contributing to local water pollution.

Other interesting features include a unique window design that maximizes daylight and reduces the need for artificial light; fine air filters in the home's ventilation system that capture contaminants to achieve an exceptional level of indoor air quality; automatic blinds that adjust according to season and time of day to increase or decrease natural daylight to desired levels; and using certified sustainable woods that protect our forests, with some wood products sourced locally to lessen the reliance on energy for transportation.

"With construction on a typical lot with suboptimal green building attributes, with a conventional builder who has not previously built 'green,' we are purposefully re-creating the challenging reality of integrating 'green' into mainstream home building. We hope to reverse the negative stigma that can sometimes be associated with green building and show that environmentally conscious construction is not incompatible with conventional building and better living," said Jonathan Philips, Senior Director with Cherokee.

The economics of building green have been debated and more research is needed. However, Philips adds, "We strongly suspect that many aspects of green-building can be incorporated in financially intelligent ways. While not all features will make financial sense in a single home context, we believe an even greater environmental impact can be made, and in a financially prudent way, when one is integrating sustainable design from the start into large scale development."

Cherokee's residential green building goals are much larger than this single home in Raleigh. With its broad scope—having redevelopment projects planned or underway throughout the United States, Canada, and Western Europe—Cherokee finds itself in a somewhat unique position to influence the acceptance of green building among the nation's home builders, contractors, architects, developers, and major real estate investors.

Cherokee's philosophy is to promote sustainable redevelopment of brownfield properties through remediation that, in turn, provides positive social, economic, and environmental improvements for the areas they serve. Since 1993, they have acquired over 520 properties enabling them to clean up and redeploy contaminated real estate, while protecting sellers, future owners, and communities from the risks and liabilities associated with environmental impairment. Currently, Cherokee has over $1 billion of property under its management.

The company has blossomed from its inception more than 20 years ago when it purchased four brick plants and became the largest privately held brick manufacturer in the Eastern U.S. Before long, petroleum-contaminated soil was discovered on one of its sites. Rather than removing the impaired soil and transporting it to a nearby landfill, Tom Darden and its founders decided to mix it with clean clay during the brick-making process. The result was a process that used the petroleum products in the contaminated clay as a fuel source to fire the bricks, thereby reducing fuel inputs to the production process and removing hazards from the environment, which would have posed threats to surface and groundwater resources. The business soon expanded to collect contaminated clay from other underground storage tank cleanups and produce top-grade bricks for construction projects, becoming the largest remediator of petroleum-contaminated soils in the Southeast. UHD

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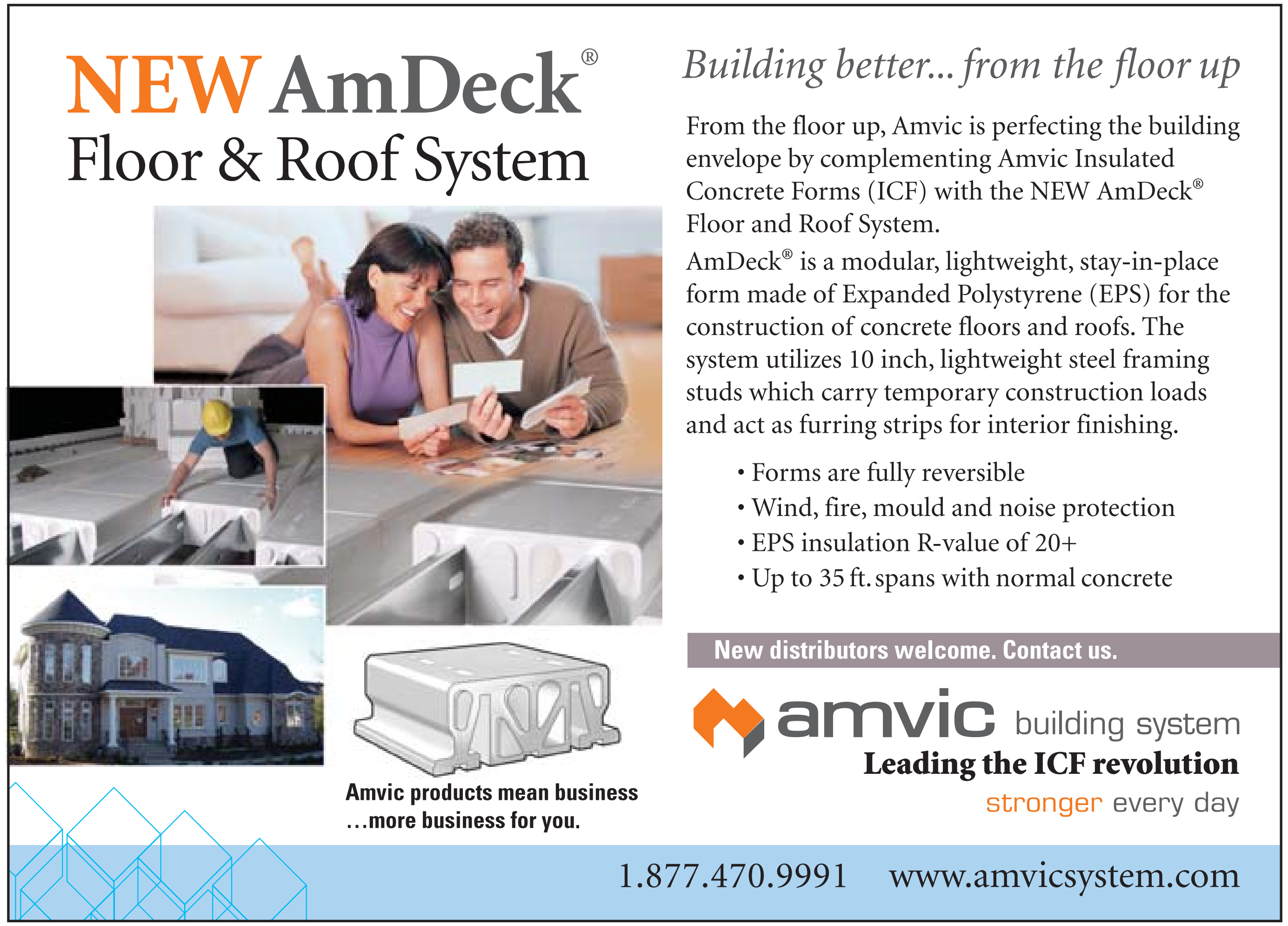

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Preparing Today

for the challenges of tomorrow

Andy Willcox

synopsis

- *Design electronics for your home so that your home is ready for when you get older.*
- *Ensure that electronic keypads and controls on devices are large enough to be read so that as you age and your eyesight is not as sharp, you won't be hindered by not being able to read the tiny print on keypads and controls.*
- *Larger buttons, with more space around them, can be helpful for people with reduced motor skills.*
- *Run the most cutting-edge wiring to all locations where you might want a keypad or touchpanel down the road, even if terminating the wire and installing products aren't in the budget now.*

Universal Design Electronics Systems

When it comes to preparing for the future, most people have a good idea of what they should do to ensure a comfortable retirement. Whether they invest in a 401K, secure a company pension, hire a financial planner, or utilize a combination of all three approaches, they've put thought into securing their financial well being later on in life.

When it comes to preparing for physical well being, the paths are a lot less clear. You can't predict which physical ailments might befall you or your family, so it's difficult to plan today for contingencies that could come up 20 years from now. That's especially tricky when it comes to electronics, which have a shelf-life of about seven years or less before they're obsolete.

According to experts with the Custom Electronic Design & Installation Association (CEDIA), there are things you can do today when designing a home that will make it that much more livable down the road. For those whose goal is to remain independent in their own homes for as long as possible, designing a few features to improve accessibility can go a long way toward preserving the quality of life.

That's one of the principles behind universal design, a concept developed by the late architect and designer Ron Mace, whose own disability led him to the idea that improving accessibility for the disabled can improve accessibility for everyone. According to the Center for Universal Design at North Carolina State University, "The intent of universal design is to simplify life for everyone by making products, communications, and the built environment more usable by as many people as possible at little or no extra cost." For example, a sidewalk ramp for wheelchair access is also beneficial to someone wheeling a grocery cart.

The principles of universal design, though most widely observed in public buildings and facilities, can also be applied to the home. "We've done a lot of work for clients with disabilities and some who are getting ready for old age," says Mario Leone, CEDIA member and senior partner with Electronic Solutions Co. in Cinnaminson, New Jersey. "Eventually, as we get older, our faculties are going to leave us short in some areas. What happens if you're not planning for that?" he asks. "Either you're forced to leave your home or need to have full-time care, neither of which is inexpensive. People love their independence. A little planning now gets your home ready for when you get older."

Electronic Solutions encourages clients to consider universal design when drawing up blueprints for a new home, both for now and the future. "During our consultation, I tell clients our goal is to enable them to live in their home as long as possible," Leone says. "That includes thinking about the time when their eyesight will start failing and they won't be able to read the tiny print on keypads."

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For clients who have trouble reading the fine print, Leone specs in a keypad with fewer, and larger, buttons. The LiteTouch E-Series keypads, for instance, feature large, square buttons with large type fonts for easy reading. The keypads can be programmed to select lighting scenes and more, minimizing the amount of interaction a homeowner needs to have with the audio, security, or spa controls. Fitting the universal design theme, the larger buttons, with more space around them, can also be helpful for people with reduced motor skills. Those who struggle with the tiny buttons on remote controls will welcome the larger button design as well.

> "Eventually, as we get older our faculties are going to leave us short in some areas. What happens if you're not planning for that?"

Hearing loss is another aging-population issue for which technology has solutions. Leone provides keyboards and special telephone devices for hearing-impaired clients who want to conduct telephone conversations by keyboard and screen. Those clients also need to be able to know the phone is ringing before they can answer it. A lighting control system can be utilized to trigger a visual cue when a call comes in. "We can tie in the doorbell and the phone and flash lights to let you know the phone is ringing or someone is at the door," he says.

For the visually impaired, Leone expands the capabilities of a whole-house audio system. Utilizing the loudspeakers built into every room, Leone uses voice synthesis through a computer to provide audible feedback of the home's status. "Say you want to adjust the temperature," he says. Clients tap a raised button on the thermostat or touchscreen to lower the temperature, and then the computer translates the tap to audible feedback announced over the loudspeakers: "The temperature set point is 70 degrees."

Leone has simple and practical suggestions as well. Rather than installing lighting keypads at the standard 54-inch height, for instance, he recommends putting them at 48 inches or less. "That way, if you're trying to flip on the lights—whether it's part of a control system or just a switch—you can do it from a wheelchair if necessary." The universal design aspect is kid-friendly too. He cites light switch accessories that parents attach to the toggle lever on a light switch so that kids can turn a light switch on or off. "If they put the switch where a kid could reach it in the first place, they wouldn't have to buy all these attachments," he notes. "And if you make it the height that a child can use, somebody in a wheelchair will be able to reach it also."

Touchscreens, used in home control systems from AMX, Crestron, Vantage Controls, Elan Home Systems, and others, can be programmed to fit the needs of homeowners. Middle-aged clients may get along fine with a full palette of buttons for lighting, music, security, and temperature, for instance. As they get older, it may be necessary to enlarge the virtual buttons in software. And putting more space around each button reduces the possibility of making an incorrect selection.

Eric Lee, owner of Integrated Control Experts in Chicago, used an array of electronics to support the independent lifestyle of a 94-year-old client. Macular degeneration led to her near blindness, so Lee went to work on electronic solutions to facilitate her daily activities. He replaced the traditional security keypads in her home with logic-based electronic card readers that could initiate a series of events in response to a pass of the card. "She swipes the card and that opens the door, turns off the alarm, and then re-arms the system for her being home," Lee says. Inside the home, lighting and other functions are accessible via "the biggest touch panel we could find—a 17-inch AMX. We made the buttons the size of her fist so she could see them."

His client's plasma TV is automated as well, although the universal design of the lift/TV system could be appreciated by any TV owner. Using motors, a lift, and precise encoders, ICE devised a system that raises the plasma TV at the foot of the bed in response to the foot height of the adjustable bed. Says Lee, "When the feet go up on the bed, the plasma lift goes up to match it."

Preparing for the future can only go so far in an industry that changes by the season. Leone and Lee encourage running the most cutting-edge wiring to all locations where you might want a keypad or touch panel down the road, even if terminating the wire and installing products aren't in the budget now. Lee also recommends running conduit to create a path for wires necessary for future technology that might not be available today.

Industry standardization of Category 5 cable for keypads, controllers, data, and phones makes it more likely that you'll be able to add products without running new wires later on. "Eight years ago everyone started converting keypads to Cat 5," says Lee. "Before that, every system—even sometimes the same company with two different systems—had proprietary cables for their keypads. Most manufacturers now use Cat 5," he says. "From a consumer standpoint it's nice because I can't think of a manufacturer that doesn't plug in to Cat 5."

You can't predict what health issues you'll have to deal with in the future, but the key is to plan for likely scenarios while you can, says Leone of Electronic Solutions. "You want to ask yourself, 'How can I set things up so that 20 years from now I can take advantage of a common infrastructure so I don't have to rip walls open and run new wires?'" UHD

The Author
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AIA Promotes sustainable design

Gary Reber

"AIA...will develop and promote the integration of sustainability into the curriculum for the education of architects and architecture students..."

synopsis

- *The AIA recognizes a growing body of evidence that demonstrates current planning, design, construction, and real-estate practices contribute to patterns of resource consumption that seriously jeopardize the future of the Earth's population.*
- *The AIA supports the development and use of rating systems and standards that promote the design and construction of communities and buildings that contribute to a sustainable future.*

Introduction

Through its board of directors, the American Institute of Architects (AIA) has adopted position statements to promote sustainable design and resource conservation to achieve a minimum reduction of 50 percent of the current consumption level of fossil fuels used to construct and operate buildings by the year 2010. To accomplish this goal, AIA will collaborate with other national and international organizations, the scientific research community, and the public health community. As part of this initiative, AIA also will develop and promote the integration of sustainability into the curriculum for the education of architects and architecture students so this core principle becomes a guiding mindset for current and future architects.

"Buildings account for 48 percent of U.S. energy consumption and generate far more greenhouse-gas emissions than any other sector," says R.K. Stewart, FAIA, facilitator of the AIA Sustainability Summit Task Force. "As architects, we must accept responsibility for our role in creating the built environment. We feel it is incumbent upon the architecture profession to alter our actions and encourage our clients and the entire design and construction industry to join us in plotting a course of measurable changes that will improve the quality of life for everyone."

For the complete AIA new position statements, visit www.aia.org/SiteObjects/files/HPBpositionstatements.pdf.

High-Performance Building Position Statements

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Sustainable Architectural Practice

Explanation

The AIA recognizes a growing body of evidence that demonstrates current planning, design, construction, and real-estate practices contribute to patterns of resource consumption that seriously jeopardize the future of the Earth's population. Architects need to accept responsibility for their role in creating the built environment and, consequently, believe we must alter our profession's actions and encourage our clients and the entire design and construction industry to join with us to change the course of the planet's future.

Altering current practices of design and construction to realize significant reductions in the use of natural resources, non-renewable energy sources, and waste production, and promote regeneration of natural resources will require a multiple-year effort in conjunction with clients, industry partners, and concerned organizations. To achieve these changes, the AIA will act through all its Board Committees, Knowledge Communities, Task Forces, Working Groups, and related activities to:

1. Promote sustainable design including resource conservation to achieve a minimum 50-percent reduction from the current level of consumption of fossil fuels used to construct and operate new and renovated buildings by the year 2010, and promote further reductions of remaining fossil fuel consumption by 10 percent or more in each of the following five years;
2. Collaborate with other national and international organizations, the scientific research community, public health community, and industry leaders engaged in issues related to sustainable/restorative design to facilitate the dialogue, share knowledge, and accelerate the rate of change for all those seeking to improve the industry's current practices and utilize integrated approaches to achieve a sustainable future;
3. Develop and promote the integration of sustainability into the curricula for education of architects and architectural students to enhance their design skills;
4. Develop standards for the architectural profession that incorporate greater sustainability into design, education, management, and licensure standards and provide resources to assist integrating these standards into the daily practices of all architects;
5. Promote documentation of the measurable contributions resulting from implemented sustainable design and construction approaches to the health of humankind and the planet to promote the value and achievements of increased use of sustainable design;
6. Promote research by industry, scientific, and governmental entities to provide the design and construction industry with full-life cycle assessment data for all products and assemblies used in the construction of the built environment at every scale in order to facilitate decision-making and communicate benefits to all;
7. Promote the AIA's building performance design targets to local, state, and national governments;
8. Communicate possible beneficial economics of environmentally responsible design to both public and private sector clients; and
9. Assume a global role as advocates for sustainable design, freely sharing knowledge and actively promoting sustainable practice throughout the world.

Sustainable Rating Systems

Explanation

The AIA supports the development and use of rating systems and standards that promote the design and construction of communities and buildings that contribute to a sustainable future.

The AIA encourages through the efforts of its Board Committees, Knowledge Communities, Task Forces, Working Groups, and related activities the inclusion of the following features in "green building" rating systems, standards, or regulations for the design and construction of the built environment. That it:

1. Is developed and renewed on a regular basis through a consensus-based process, in which all interested parties can participate;
2. Require clearly defined design documentation to demonstrate compliance;
3. Require compliance to be validated by an independent third party;
4. Require the development of sustainable sites avoiding the conversion of prime agricultural lands or wetlands, regenerating brownfield sites, or those that result in regenerative benefits to the natural environment;
5. Require specific goals in the efficient use of water resources that promote application of new wastewater technologies;
6. Require specific goals for significant reductions in energy use, especially non-renewable energy sources, with enhanced performance assured through commissioning of building systems;
7. Promote the use of renewable energy sources;
8. Require reduced use of non-renewable natural resources through the reuse of existing structures and materials, reductions in construction waste, promotion of recycled content materials, and use of materials independently certified as from sustainable sources;
9. Require specific goals for improved indoor environmental quality through enhanced indoor air quality, thermal comfort, acoustics, daylighting, and pollutant source control and use low-emission materials and building system controls;
10. Promote the development and application of innovative designs and collaborative processes intended to improve environmental performance;
11. Recognize the life cycle value of a community or project in addition to construction first costs, including assessment of impact on climate change, acid rain, water pollution, resource depletion, and toxicity factors;
12. Utilize life cycle assessment data as the basis for design and construction decision making;
13. Acknowledge national, regional, and bio-climactic differences;
14. Reduce (and eventually eliminate) on-site and off-site toxic elements in the built environment;
15. Require specific measurable reductions in CO_2 production in the built environment; and
16. Require documentation of actual building energy and operational performance. UHD

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